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The State of the Art in Psychic Research

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SPECIAL EVENING SESSION

THE STATE OF THE ART IN PSYCHIC RESEARCH

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A LOOK AT THE EXCEPTIONAL

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INTRODUCTION

An inherent danger for a maturing democratized society, is that the pursuit of egalitarian goals creates neglect of the very characteristics which allow attainment of success; that is, the pursuit of excellence, emphasis on creativity and nurturing of those exceptional human beings who possess the rare talents needed in the vanguard of human progress. Without such talents being utilized by leadership throughout history, mankind would still be struggling in the dark ages. If a modern society fails to continually cultivate those areas where creative intelligence can mature into exceptional capabilities, the society will find itself slipping back toward the more primitive values and institutions characteristic of mundane leadership.

Noble social goals to improve the lot of the least talented cannot possibly succeed without developing the highest capabilities of the most talented who can lead the way.

> "To give a fair chance to potential creativity is a matter of life and death for any society. This is all important because the outstanding creative ability of a fairly small percentage of the population is mankind's ultimate asset and the only one with which Man has been endowed."
> .....Toynbee -- January 1966[1]

To emphasize this need--whereas United States Federal expenditures for social betterment is hovering near the 50% mark of the total budget of about $400 billion dollars, the most recent figures show only 2.56 million devoted to training, understanding and research of "gifted" individuals and their exceptional talents. This is approximately .0013% of the Federal expenditures for achieving social goals and is a distressingly small investment considering the magnitude of the problem.

The creative, cognitive and intellectual potential of the human mind is vast and of almost limitless variation. On the other hand, the characteristics that distinguish the unusual talent from mediocrity are not at all understood. In fact, some of the unusual talents possessed by a few are not even believed, much less understood.

It is toward such understanding and what it could achieve that this author's effort is devoted.

* * *

A century of competent but always controversial research by dedicated men and women of science demonstrates convincingly, for those who will study the record, that a variety of extraordinary capabilities are indeed facts of our existence. Further it seems, human beings are usually, and probably always the causative agents. Not only is the range of verifiable events quite large, but the lines of evidence point to little understood properties of our human mental machinery as perpetrator of, or at least collaborator in, these events. They have been inappropriately described as: miraculous, PARAphysical, PARAnormal, SUPERnatural, "spirits" and other such terms which make a traditionalist's skin crawl. For this reason, it is important to dispel any notion that this paper will give strength to ideas of "unnaturalness". Let us attempt to cut through superstition and myth and get to the crux of the matter regarding cause, but keeping in mind that "natural" does not necessarily imply a "material" or conventional viewpoint. Quite the contrary.

To the extent that each of the reported capabilities is valid and observable, it is part of the natural order of the universe which people in science attempt to understand. There are no unnatural or supernatural phenomena, only very large gaps in our knowledge of what is natural, particularly regarding relatively rare occurences. We should strive to fill those gaps of ignorance. The fact that claims about many phenomena have associated with them a high "giggle factor" and have historically attracted an unsavory assortment of cranks, quacks, frauds and charlatans who prey upon the gullible, should not deter the dedicated investigator from seeking the truth. Let it be remembered that in the world of science, the methods and the subjects one must use for observations are not always neat, clean and tidy. In its infancy, pathology was dependent upon grave robbers, and microbiology is indebted to contents of the chamber pot in order to gain knowledge about human functioning. No less onerous is the environment of the contemporary investigator who chooses to study the functioning of extraordinary human mental processes.

Only in recent months, after many years of effort by a handful of dedicated investigators, including individuals presenting their results at this conference, has it been possible to bring certain investigations out of the closet and to publish research results in prestigious professional journals. This fact reflects equally the perseverance of the investigators and the entrenched rigidity of our scientific

traditionalism.

With all candor, however, it must be stated that of the varied forms of extraordinary mental activity, the most shunned of which bear that distressing label "psychic", only a few have yet achieved a sufficient level of scientific control and scrutiny to be repeatably demonstrable under laboratory conditions. Some that meet the test are: telepathy, precognition, clairvoyance and now, remote viewing, which perhaps includes several of the other categories. These forms of activity rightly deserve to be accepted and explained by the scientific community at large.

There are numerous other events, however, which are quite real but relatively more rare, and which have proven to be more difficult to control. These have yet to be adequately documented in the manner required by our traditional methodology. This is true as much because of the limitation of our methods and concepts as the rarity of events. We must remember that it is not nature's task to adapt to our rigid, and often erroneous, preconceived notions, but rather our task to be sufficiently creative and intelligent to understand the myriad clues nature gives us. The experienced field investigator who has travelled to different parts of the world to observe and measure in situ those individuals who possess these extraordinary faculties should be heeded. Many have arrived at the conclusion that, in fact, ALL the various reported events can be, and often are, genuine occurrences. I refer in these cases not only to prodigious feats of computation and memory, but more specifically to major psychokinetic phenomena which have been observed and reported by reliable investigators. None of these have, as yet, been sufficiently studied under laboratory conditions. It is this author's contention, however, that in the fullness of time, the entire class of psychokinetic events will be learned and brought under the conscious control of a sufficiently large sample of individuals that field studies can move into the laboratory where more careful scrutiny is possible.

It is because many experienced observers agree strongly with the view that all the mental functions now considered extraordinary will, in due course, be made more ordinary; that it is time to speculate about what this will mean to our social functioning and institutions. Is there an obvious impact not only on our thinking and way of daily life, but also on our values?

Toward that end, let us analyze that class of extraordinary human mental functioning often referred to as "psychic" and from the sparse knowledge we currently have, speculate what is likely to happen should this class of events move out of the realm of extraordinary and become more accepted, and perhaps more available to human beings.

Preliminary indications are that the potential for psychic functioning is like musical talent, widely but not uniformly distributed. Further, in the western cultures, there are good indications that it has been suppressed as being evil or alternatively, psychotic. Like other talents, it requires a certain level of skill and technique, which apparently can be developed with proper training and perseverance. The degree to which an individual, or group of individuals, can become more proficient in psychic functioning, and the factors that govern proficiency are still not clear. One should not lightly dismiss the admonitions of mystics of nearly every culture who seem, as a group, to be the most proficient. They urge caution and have for centuries cloaked their rites in secrecy and ritualistic language. In order to gain the forbidden knowledge, they prescribe ascetic disciplines of behavior and training to safely achieve the emotional stability and spiritual purity necessary for proficient functioning. Whether these precautions are valid, or whether they serve merely to preserve the status and mystique of the elite few, is a proper subject for conjecture.

For the purpose of this speculation on societal implications, assume that satisfactorily safe training can be effected and permit us to classify the events into the following categories:

I. Animate awareness. This includes the traditional categories of telepathy and pre and post cognition and includes the subsets: self-awareness and awareness of other animate life forms.

II. Matter awareness. This also includes traditional categories but is distinguishable from category I in that the information received pertains to other than the animate universe.

III. Animate control. This category is concerned with the active processes of exerting direct or indirect influence on another individual or group of individuals by extraordinary means and includes, as a subset, control of other forms of animate life. It also includes, as a subset, the ability to control one's own physical mechanisms beyond the boundaries currently understood in classical psychology and physiology.

IV. Matter control. This category includes the traditional notion of telekinesis or psychokinesis as applied to the inanimate universe.

I have chosen to use these categories rather than the traditional parapsychological terminology because they represent an ascending order of rarity and complexity, not only in interpretation but also in the implications they produce for the social order.

It is not the purpose here to deal extensively with the scientific implications of these categories. These issues can be discussed far more capably and succinctly by persons highly skilled in disciplines such as theoretical physics, mathematics, neurophysiology and psychology. I shall touch upon the scientific question only briefly by suggesting that the crucial issue is whether or not these events can be formalized within the confines of classical theories. All would breathe a sigh of relief if this were found to be true. On the other hand, there is no compelling reason to believe that our knowledge of the universe is so complete that in the short century of modern scientific inquiry we have completely ferreted out all nature's secrets.

It is reasonable to hope that categories I, and II, and some phenomena in category III could be explained within classical structure, or by modest extrapolations therefrom. On the other hand, it is exceedingly difficult to understand how category IV, consisting of "mind over inanimate matter", can be understood without major reworking and expansion of current concepts about the fundamental nature of matter and additionally some new insights about the nature of mind.

It is the author's personal bias that as a result of the study of category IV events, the Idealist Model (i.e., that conciousness and thought represent the fundamental action principle of the universe) will be essential for explaining these events. (The competing models are the Materialist Model, in which matter is the fundamental "stuff" of the Universe and the Dualist Model in which matter and thought are separate and distinct realms.)[2]

However, rather than pre-empt here the theoretician's job of explaining such events it will suffice to suggest that, in due course, all four categories will be established as valid and will require explanation. Personal observations to date, convince me that all these categories are a part of the natural order of an evolving universe. They will be developed in sufficient measure during coming generations to exert influence for the betterment or destruction of our social system.

* * *

To digress, a further discussion of the four individual categories previously mentioned will facilitate in understanding them.

Category I is concerned with awareness of and perceptiveness about other living systems. This awareness appears to extend the boundaries of conventional notions about space, time and information flow. An individual with fully developed perceptual capabilities could, at will, be aware of the feelings, emotions and thoughts of other individuals. The limits of information resolution and the range of subject matter that can be perceived in this manner have yet to be explored. However the remote viewing experiments of Puthoff and Targ[3] give some indication that the distance, range and resolution of information transferable between cooperating persons is considerable.

Not only is objective information transferable from mind to mind, the condition of the transmitting system is usually discernable. Is it healthy, is it comfortable, is it honest, or is it lying? What would it be like to live in a society where one's inner feelings, state of health and covert motivations could be perceived directly?

Duplicity, dishonesty and deception would no longer be useful characteristics. With awareness fully developed in a social structure, individuals would either become totally honest, with life as an open book or become paranoid from one's baser motivation being continually perceived.

The diplomatic, political, military and promotional games that society currently enjoys, upon which much institutional interaction is based, of necessity, must fall apart. The alternative is an "awareness race" in which adversaries engage in the self defeating practice of keeping score and out maneuvering the other's deceptions.

This differs from current practice only in the speed and directness with which it takes place.

An important element of animate awareness is deeper self awareness. Achievement of greater awareness of other living systems is not as likely to occur without first or, at least concurrently achieving greater self awareness. Being able to discern accurately and honestly one's own condition, needs, and motivations may, in the final analysis, be the most important social advance to evolve from our exploration of extraordinary mental functioning.

* * *

If an individual can "swallow" the events and implications of Category I, then Category II

is only a small step forward. This category directly implies a notion which modern society is approaching from a different viewpoint. That notion is: the interconnected and interdependent relationships of all matter.

Ecological studies are convincing even the most ironclad pragmatist that man cannot, with impunity, tinker with the delicate balances in nature. Recognition of the interdependency of seemingly unrelated systems suggests that there is no closed system smaller than the entire universe. Although many systems appear substantially independent, there always can be found a small flow of energy or information across the boundaries which influences the processes of the system and creates change.

Category II awareness suggests that information about the "states of matter" can be directly perceived by the human organism by, as yet, unknown processes.

To cite a practical example, the studies by Douglas Dean on "Executive E.S.P."[4] show a strong correlation between the decision making abilities of successful executives and their ability to precognize a random ordering of numbers subsequently selected by a computer. From this study, it would seem that successfully guessing the future needs of a company requires some of the same skills required for successfully guessing the outcome of random inanimate events. For this to happen, some information flow from the matter and from the future event must take place so that it can be perceived by the human organism.

If one develops this notion to its logical extreme, one arrives at the concept that any information about the universe and its functions is directly knowable to a talented and trained individual who chooses to obtain such information.

As has been previously stated, questions about who can be trained, transfer mechanisms, limits of resolution and bit rates, for example, have yet to be answered. However, broadly speaking, the implication of Category II awareness is but an extension of Category I, namely that the universe is an "open book" to those who become trained to read it. Many current ideas and priorities at all levels of social and institutional functioning with regard to secrecy, proprietary information, and decision making will, of necessity, require modification.

One is challenged to ask at this point, "Is mankind ready for this?"

* * *

Category I and II awarenesses are essentially concerned with the passive process of gaining information by direct cognition, direct perception, intuition, or any number of other terms which are more or less applicable to these little understood processes. Both categories imply vastly expanded awareness functions available to some, perhaps many humans, through mechanisms yet to be formally explained. The foregoing speculations about what one might expect if large numbers of humanity could develop these abilities to a high art, represent a deduction carried to its limit. The truth is probably less dramatic and, probably lies short of the limit, at least in the foreseeable future.

As dramatic as the previous discussion of passive processes may seem, it pales in comparison to the implication of the active process of Categories III and IV.

Category III is direct control of animate systems. Keep in mind, that in today's world, humans attempt to control the animate universe through the usual channels of communication, with appeals to reason, law and self interest. Where such appeals fail, resort is made to manipulation and coercion. Category III only adds another tool to our bag of tricks, a tool realized by conciously changing the information flow of Category I from a passive process of awareness to an active process of projection. All of the benefits and detriments currently enjoyed by humanity are accentuated by addition of this powerful means of direct influence. The opportunity for beneficial assistance seems great but the opportunity for coercion and manipulation of the unaware seems even greater.

Perhaps the most important beneficial aspect of Category III is the implication of greater control of the individual's own organism.

The traditional notion is that humans are limited in concious control of the self by many physical and psychological factors. Certainly studies in biofeedback, meditation, hypnosis and guided imagery suggest that control can be greatly extended beyond what has been considered possible and, perhaps, down to the level of individual cells in the body. If such techniques can become well developed, the implication for self improvement, health, well being, wisdom and fulfillment are quite profound.

It should go without saying that the proper training technique for gaining control of Category III capabilities is to first learn to control self and then, cautiously, extend one's boundaries out toward the rest of the animate universe. (Nature's wisdom regarding Man will hopefully prevent any other approach.)

* * *

Category IV is the control of inanimate matter. This, of course, is the most provocative, most rare, most controversial and least understood of capabilities. The Western world still does not generally accept this type functioning as a part of reality. However, it is analogous to the "white crow" problem in logic. Finding just one of the set proves that the set exists. Similarly, finding just one bonafide case of mind over inanimate matter proves that such control exists. Finding additional individuals capable of such control poses untold problems, challenges and implications for the belief systems that shape our reality. In the minds of many capable field investigators, the traditional paradigm has already been shattered.

The practical implications of this are probably small, since few are likely to develop such capabilities to a high proficiency. The profundity of the issue lies in the implications to our system of thought about the nature of Man, the Universe and Reality. In spite of the relative rarity of these events, the question must be asked, "Could it be that we, each one of us, every day, by our thoughts are subtly influencing our environment, our reality, our Universe, without consciously knowing it, or is this type control strictly the province of a few rare individuals who possess this unique capability?"

* * *

In closing, the desire in presenting these ideas was to ask the provocative question, to illustrate with the extreme example, and to examine the broad implications of what must be considered "extraordinary events". It is left as an exercise for the reader to fill in the gaps, to ask questions regarding day-to-day implications for such fields as medicine, business, politics and education. Such exercises are illuminating, startling and very much worth doing. These ideas present significant challenges to those interested in the progress of knowledge.

Whatever the thoughts one holds about the events and the research presented at this session, it is important to keep in mind the following facts: 1) the "white crow" exists, 2) the attention devoted to the study of extraordinary human functions is still appallingly little, and 3) Toynbee's quote at the beginning of the paper can be summed up:

"Where do we go from here?"

* * *

References

1. Toynbee, Arnold J., - "Is America Neglecting Her Creative Minority?" Accent on Talent., Vol. II, January 1968.

2. Mitchell, Edgar D., et al., Psychic Exploration: A Challenge for Science., G.P. Putnam's Sons, 1974.

3. Puthoff, Harold and Targ, Russell, - Proceedings of IEEE., March 1976.

4. Dean, Douglas E. and Mihalsky, John, Executive ESP., Prentice Hall, 1974.

DIRECT PERCEPTION OF REMOTE GEOGRAPHICAL LOCATIONS

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ABSTRACT

For the past five years we have been investigating aspects of human perception that appear to fall outside the range of well-understood perceptual/processing capabilities. Of particular interest is a human information-accessing capability that we call "remote sensing." This phenomenon pertains to the ability of certain individuals to access and describe, by means of mental processes, information sources blocked from ordinary perception (for example by distance or shielding) and believed to be secure against such access. In particular, the phenomenon we have investigated most extensively is the ability of a subject to view remote geographical locations up to several thousand km distant from his physical location, given only a known person on whom to target.[1-3] We have recently carried out coast-to-coast experiments using a computer network to interface with individuals whose remote perceptual abilities have been developed sufficiently to allow them to describe--often in great detail--geographical or technical material such as buildings, roads, and natural formations.

Our accumulated data indicate that both specially selected and unselected persons can be assisted in developing remote perceptual abilities up to a level of useful information transfer. Further, the extent of physical distance separating the subject from the target site up to transcontinental distances does not appear to significantly affect the accuracy of the perception.

INTRODUCTION

In over 70 laboratory experiments that now include work with more than a dozen subjects, we have investigated an often-reported human perceptual ability that has heretofore not been widely investigated in the laboratory. This ability, brought to our attention by a subject, Mr. Ingo Swann, we term "remote sensing." It is an ability by which human subjects perceive, and describe by word and drawing, distant scenes and activities blocked from ordinary perception. In these experiments, subjects have been able to describe with equal accuracy scenes at both local sites (that is, within a few miles) and those at transcontinental distances.

As observed in the laboratory, the basic phenomenon appears to cover a range of subjective experiences variously referred to in the literature as autoscopy (in the medical literature); exteriorization or disassociation (psychological literature); simple clairvoyance, traveling clairvoyance, or out-of-body experience (parapsychological literature); or astral projection (occult literature). We choose the term "remote sensing" as a neutral descriptive term free from prior associations and bias as to mechanisms.

The need for a supportive setting to overcome prevailing societal prejudices against such remote sensing has been provided within the confines of the Electronics and Bioengineering Laboratory and the Radio Physics Laboratory at Stanford Research Institute (SRI). Here, throughout our research spanning a five-year period, we have worked with new and untrained subjects so as to avoid reliance on the availability of a very limited number of special subjects. Remote perceptual abilities in several individuals have now been developed sufficiently to allow them to describe--often in considerable detail--geographical or technical material such as buildings, roads, and real-time activities.

Since the initial publication of our investigations of this remarkable phenomenon,[1,2] four successful replication experiments have been performed in other laboratories across the country.[4-7] In addition, we have learned through private communications of several unpublished studies of other successful experiments in paranormal functioning of this type.

In this paper we describe the experimental protocol used to carry out the research and the formal judging procedure used to quantify the results. In addition, we detail recent experiments in coast-to-coast remote viewing that have yielded results similar to those obtained in the initial experiments using relatively local target sites. Finally, as a step toward achieving our research aim of using the experimental data base to deduce relevant physical principles and laws governing paranormal or psi functioning, we examine some physical models potentially applicable to remote perception.

EXPERIMENTAL APPROACH

Description of the Protocol (Local Targets)

The general protocol is to closet a subject with an experimenter at SRI and at a prearranged time to obtain from the subject a description of an undisclosed, remote site being visited by a target team. In each of the experiments, there is an SRI experimenter on the target demarcation team at the remote

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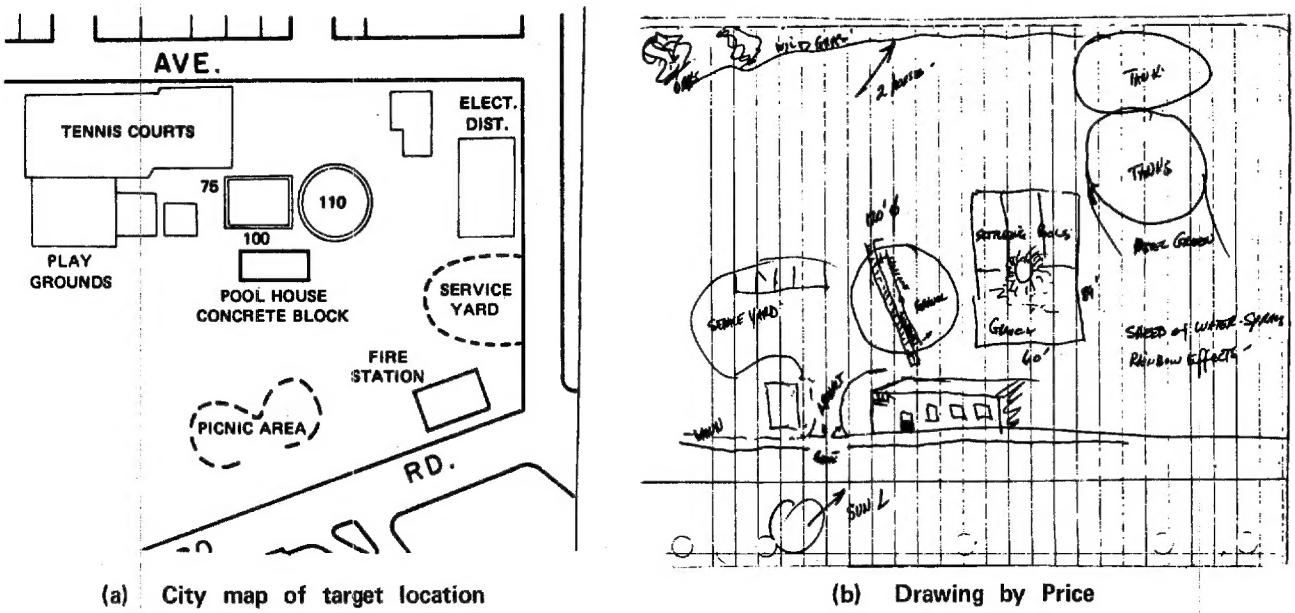


(a) City map of target location

(b) Drawing by Price

FIGURE 1 SWIMMING POOL COMPLEX AS REMOTE VIEWING TARGET

location that is chosen in a double-blind fashion outlined below.

An outbound experimenter is assigned a target location by an independent experimenter who has generated a list of targets located within a 30-minute driving time from SRI, and who accesses this list by a randomization procedure. The target pool consists of more than 100 target locations chosen from a target-rich environment. The target location selected is kept blind to both the subject and experimenter closeted at SRI.

In detail: To begin the experiment, a subject is closeted with an experimenter at SRI to wait 30 minutes before beginning a narrative description of an undisclosed remote location that will be the target for the experiment. A second experimenter, accompanied by other members of a target demarcation team, then obtains sealed traveling orders from a monitor who has previously prepared and randomized a set of such orders. After leaving SRI by automobile, the target demarcation team opens the traveling orders and proceeds directly to the target without any communication with the subject or experimenter remaining at SRI. The experimenter remaining with the subject in the SRI laboratory is kept ignorant of both the particular target and the target pool so as to eliminate the possibility of cueing (overt or subliminal) and to allow him freedom in questioning the subject for clarification of his descriptions. The target demarcation team remains at the target site for a prearranged 15-minute period following the 30 minutes alloted for travel. During the observation period, the experimenter in the lab tape-records the subject's remote viewing impressions of the target site and collects any drawings made by the subject. After the target demarcation team returns to SRI, the impressions obtained from the subject are compared with the actual observations of the team. Finally, following the experiment, the subject is taken to the site so that he may obtain direct feedback.

Initial Experimental Series with a Subject Experienced in Remote Viewing

Our first subject in a formal series of experiments to investigate the remote viewing function was Mr. Pat Price, a former California police commissioner and city councilman, who participated in nine experiments. Mr. Price came to our experiments with a reported history of spontaneous remote viewing experiences. In general, Price's ability in our experiments to describe correctly buildings, docks, roads, gardens, and the like, including structural materials, color, ambience, and activity--sometimes in great detail--indicated the functioning of a remote perceptual ability. A Hoover Tower target, for example, was recognized and correctly named. Nonetheless, Price's descriptions generally contained inaccuracies as well as correct statements. A typical example is indicated by his drawing shown in Figure 1 in which he correctly described a park-like area containing two pools of water: one rectangular, 60 X 89 ft (actual dimensions 75 X 100 ft); the other circular, diameter 120 ft (actual diameter 110 ft). As can be seen from his drawing, he also included some elements, such as the tanks shown in the upper right, that are not present at the

target site. We also note an apparent left-right reversal, often observed in paranormal perception experiments.

Further, he incorrectly indicated the function of the site as water purification rather than recreational swimming. We often observe essentially correct descriptions of basic elements and patterns coupled with incomplete or erroneous analysis of function. This theme emerged as a thread which continued throughout our work and eventually led to a breakthrough with regard to an understanding of the interrelationship between paranormal perception and cerebral functioning, namely: that paranormal functioning may involve specialization characteristic of the brain's right hemisphere, which predominates in spatial and other holistic processing, in contrast to the left hemisphere which predominates in verbal and other analytical functioning.[8-10]

Judging of Results

To obtain a numerical evaluation of the accuracy of the remote viewing experiment, the experimental results were subjected to independent judging on a blind basis by an SRI research analyst not otherwise associated with the research. Price's response packets, which contained the nine typed, unedited transcripts of the tape-recorded narratives and associated drawings, were unlabeled and presented in random order. Working alone, the analyst visited each target location in turn and in a blind fashion rated Price's descriptions on a scale 1 to 9 (best to worst match). The statistic of interest is the sum of ranks assigned to the target-associated transcripts, lower values indicating better matches. For nine targets, the sum of ranks could range from nine (for perfect matching) to eighty-one. The technique for calculating the probability that a given sum of ranks s or less will occur by chance is given in Reference 2. The results of the judging, shown in Table 1, included seven direct hits out of the nine. The overall result was statistically significant at $p = 2.9 \times 10^{-5}$. Table 1 also indicates the various types of targets used in this series. Further, in experiments 3, 4, and 6-9, the subject was secured in a double-walled copper screen Faraday cage, which provides 120-dB attenuation for plane-wave radio-frequency radiation over the range of 15 kHz to 1 GHz. The results of rank-order judging indicate that the use of such shielding does not prevent high-quality descriptions from being obtained.

Replication Series with a Subject Inexperienced in Remote Viewing

Having completed this initial series of experiments with Price, we concluded that remote viewing was both a real and a robust phenomenon. Our next task was to try to find out how widely distributed the ability was in the general population. We began with the following replication experiment.

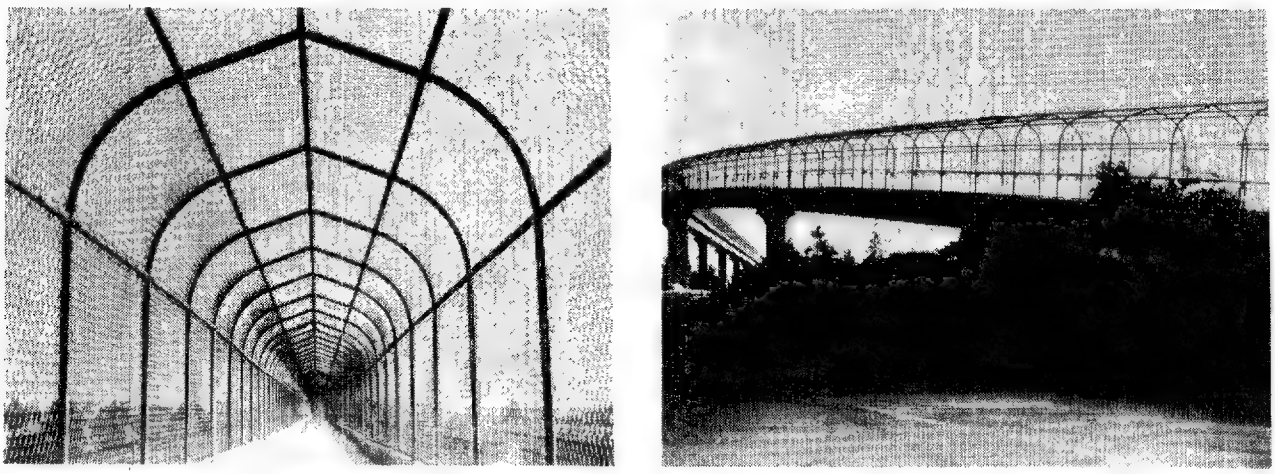
Table 1

DISTRIBUTION OF RANKINGS ASSIGNED TO TRANSCRIPTS ASSOCIATED WITH EACH TARGET LOCATION FOR EXPERIENCED SUBJECT PRICE

Target Location	Distance (km)	Rank of Associated Transcript
Hoover Tower, Stanford	3.4	1
Baylands Nature Preserve, Palo Alto	6.4	1
Radio telescope, Portola Valley	6.4	1
Marina, Redwood City	6.8	1
Bridge toll plaza, Fremont	14.5	6
Drive-in theatre, Palo Alto	5.1	1
Arts and Crafts Plaza, Menlo Park	1.9	1
Catholic Church, Portola Valley	8.5	3
Swimming pool complex, Palo Alto	3.4	1
Total sum of ranks		16 ($p=2.9\times10^{-5}$)

The subject for this experiment was Mrs. Hella Hammid, a gifted professional photographer. She was selected for this series on the basis of her good performance as a percipient in an earlier EEG experiment designed to measure physiological response to remote strobelight stimuli, a hypothesized screening procedure for remote viewing. Outside of that interaction, she had had no previous experience with apparent paranormal functioning.

At the time we began working with Mrs. Hammid, she had no strong feelings about the likelihood of her ability to succeed in this task. This was in contrast to both Ingo Swann, who suggested these experiments and who had come to our laboratory fresh from an apparently successful series of similar experiments with Dr. Karlis Osis at the American Society for Psychical Research (ASPR) in New York[11] and



Pedestrian Overpass Target

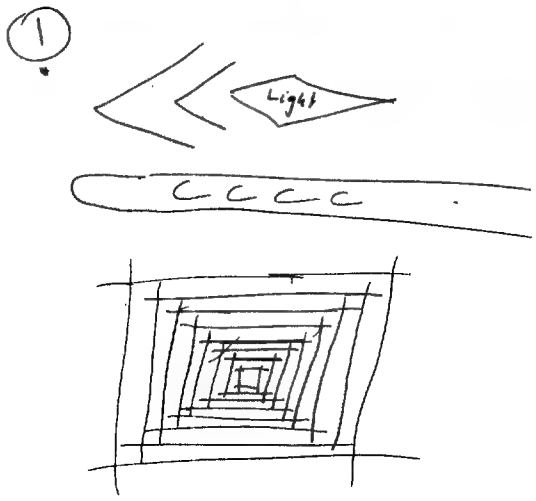


FIGURE 2 SUBJECT HAMMID DRAWING, DESCRIBED AS "SOME KIND OF DIAGONAL TROUGH UP IN THE AIR"

Pat Price, the first subject in our formal series of experiments, who felt that he used his remote viewing ability in his everyday life.

In working with an inexperienced subject, we must take into account the fact that many people are influenced to a large degree by their environment and by public scrutiny when it comes to activities generally considered to be impossible. A reluctance to cope with negative feedback from society often inhibits individuals from exploring a potential for paranormal perception. Therefore, in addition to maintaining scientific rigor, one of our primary tasks as researchers is to provide an environment that lends protective support for a subject to pursue such exploration. With a new subject, we also stress the nonuniqueness of the ability because our experience indicates that paranormal functioning is a latent ability that all subjects can demonstrate to some degree.

We observed in working with Price that in remote viewing structure and form tended to be correct even when interpretation was incorrect. We therefore found it an advantage that Mrs. Hammid's artistic background enabled her to draw and describe visual images that she could not identify in any cognitive or analytic sense. When the target demarcation team went to a pedestrian overpass target location, for example, the subject said that she saw "a kind of diagonal trough up in the air," which she indicated in the upper part of her drawing in Figure 2. She further explained that "If you stand where they are standing you will see something like this," indicating the nested squares at the bottom of Figure 2. As can be seen from the photograph of the target location as shown in Figure 2, a judge standing where she indicated would have a view closely resembling what she had drawn. We emphasize, however, that judges did not have access to our photographs of

the site, used here for illustrative purposes only; rather, they proceeded to each of the target locations according to a list.

As in the original series with Price, the results of this nine-experiment series were submitted for independent judging on a blind basis by an SRI research analyst not otherwise associated with the research. According to the judging procedure previously outlined in the section, "Judging of Results," the judge ranked each target location on a scale of 1 to 9 (best to worst match) on the basis of the narratives and drawings submitted by the subject. The sum of ranks assigned to the target-associated transcripts was statistically significant at $p = 1.8 \times 10^{-6}$. This included five direct hits and four second ranks as shown in Table 2 along with the locations of the nine experiments in this set.

Table 2

DISTRIBUTION OF RANKINGS ASSIGNED TO TRANSCRIPTS ASSOCIATED WITH EACH TARGET LOCATION FOR LEARNER SUBJECT HAMMID

Target Location	Distance (km)	Rank of Associated Transcript
Methodist Church, Palo Alto	1.9	1
Ness Auditorium, Menlo Park	0.2	1
Merry-go-round, Palo Alto	3.4	1
Parking garage, Mountain View	8.1	2
SRI International Courtyard, Menlo Park	0.2	1
Bicycle shed, Menlo Park	0.1	2
Railroad trestle bridge, Palo Alto	1.3	2
Pumpkin patch, Menlo Park	1.3	1
Pedestrian overpass, Palo Alto	5.0	2
Total sum of ranks		13 ($p=1.8\times10^{-6}$)

In comparing the results of the Hammid and Price experiments, we observe a difference in the subjects' styles that evidently affected the pattern of results. The descriptions from Price were usually more detailed than those of Hammid and thus led to more first-place matches--that is, direct hits in the rank order judging. At the same time, his striving for detail produced erroneous analytical interpretations that resulted in two distinct mismatches. On the other hand, the more restrained narratives of Mrs. Hammid resulted in fewer first-place matches, but none fell below second place. Such a comparison of results does not indicate that one subject necessarily has more paranormal perception than the other, but rather shows the effects in this type of judging procedure due to a difference in style.

Experiments with Unselected Subjects

After more than a year of following the experimental protocol described above and observing that even inexperienced subjects obtained results better than expected, we began a series of experiments to explore further whether individuals other than so-called "psychics" could demonstrate the remote viewing ability. To test this idea, we initiated an extensive series of experiments using unselected subjects and local targets in the Bay Area. We had no particular reason to believe that these additional subjects possessed paranormal perceptual ability.

These experiments served a twofold purpose. First they provided an opportunity to obtain data that indicate the level of proficiency that can be expected from unselected volunteers. Second, they served to dispel concerns about the possibility of deception. For example, many scientists from the government and elsewhere have visited our laboratory to decide whether their particular departments should be concerned with paranormal research. Their requests generally focus on a desire to "see something psychic," and we had been willing to demonstrate the remote viewing protocol with one of our subjects. However, when an individual observes a successful experiment demonstrated with another person as subject, it inevitably occurs to him that perhaps chicanery is somehow involved. We have found that the most effective way to settle this issue is to have the doubter become the subject, thereby providing him with personal experience as a basis for evaluating our experimental protocols and reported results. Consequently, we have discontinued demonstration experiments. Instead, we ask the visitor to become a subject so that he can personally evaluate what he experiences and sees. After the experiment, he is then taken to the target site where he can determine firsthand if it corresponds to what he has visualized during the experiment. We have found that the actual experience as a subject of successful remote viewing is by far more instructive than observation of what someone else has done. The following results

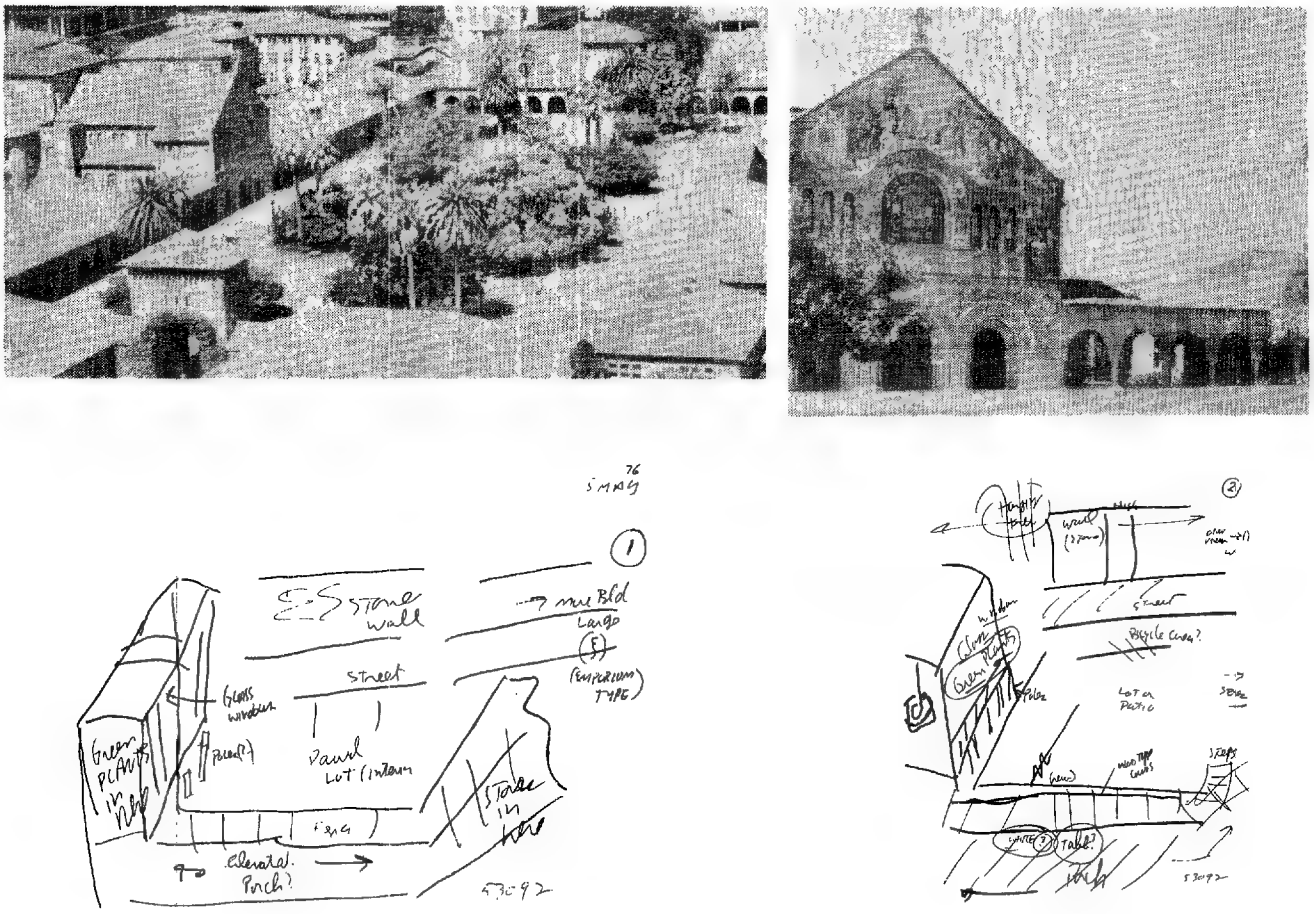


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FIGURE 3 STANFORD UNIVERSITY, INNER QUADRANGLE — TARGET; SKETCHES PRODUCED BY SUBJECT INEXPERIENCED AT REMOTE VIEWING

obtained with the last two visitors who agreed to act as subjects provide specific examples.

The first was an electrical engineer who was interested in evaluating our work. We explained to him that the only demonstration we were prepared to offer was the experience that he himself might have in being a remote viewing subject.

His first target location (determined by the standard random protocol) turned out to be a locale known as the Baylands Nature Preserve. Our visitor described and drew a long wooden walkway and indicated the presence of extensive gardens, an accurate depiction of the target site. However, he also described seeing a building that is not at the target site. This sort of superposition of erroneous imagery on otherwise accurate descriptions is a common occurrence and is the principal source of noise to be overcome if remote viewing is to become a useful tool.

The next day we carried out a second experiment with this visitor. This time the randomly-determined target was the inner quadrangle at Stanford University. Our subject described a courtyard and made the two drawings shown in Figure 3. Almost every element of his drawings corresponds to the actual arrangement at the location of the remote experimenters. These responses are among the most accurate and detailed that we have ever seen. This target had never been used before, and the visitor indicated that he had never been to the Stanford Campus before nor had he ever seen a photograph of this location.

A second result, typical of what we have come to expect from the remote viewing protocol, was obtained with our most recent visitor/volunteer, a physics professor who was skeptical of our reported results. This man had been lecturing on the West Coast and came to SRI to learn firsthand of our research. In addition to hearing our description of the protocol, he was also invited to participate as the subject in an experiment so that he could personally evaluate

the experimental aspects of the remote viewing channel.

The target chosen by random protocol was White Plaza at Stanford University, the second time in four years that this particular site came up for experimental use. The subject gave an excellent description of the plaza and the surrounding buildings and produced the drawing shown in Figure 4. In addition, he also correctly described the motion of the outbound experimenter who circled the fountain in a clockwise direction as shown in the subject's drawing.

The results obtained with these two men are not isolated examples selected from many unsuccessful trials. Rather, they are simply the most recent examples of visitor first-time cases, and are typical of what we have come to expect from any serious attempt at remote viewing.

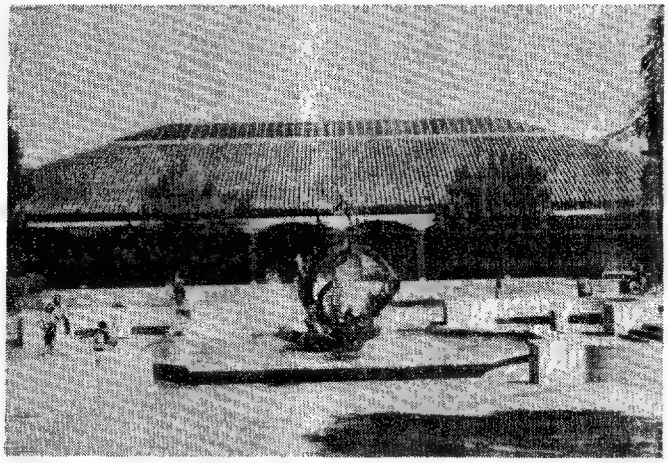
LONG-DISTANCE EXPERIMENTS WITH TELECONFERENCING

After establishing a data base of over 50 experiments with local targets (sites within a few miles), we undertook an experimental series designed to determine whether an increase in subject-target separation to transcontinental distances would degrade the quality or accuracy of perception. As a secondary goal, we were interested in the real-time data rate; e.g., determining the extent to which a remote viewing subject can track the real-time activities and movements of a known individual in a distant city. The only communication between the outbound experimenter (e.g., in New York City) and a subject in the SRI Laboratory (Menlo Park, California) was by means of the ARPA computer net. Access to the computer by the traveling experimenter was by means of a portable terminal carried from point to point.

Following are the results obtained in this series, which consists of five experiments to date.

New York-California Experiments

The protocol for this experiment allowed the subject at SRI in California and the experimenter in New York City to communicate via the conversational TALK mode available on the ARPA computer net. The subject and the experimenter at SRI agreed (via computer teleconferencing) to begin an experiment one-half hour later. The purpose of the computer in this experiment was to provide time- and date-stamped permanent records of all communications between the various parties involved in the experiment. These data can be read in real time by any authorized person entering the SRI-AI Tenex (MSG) system.



Remove Viewing at White Plaza Stanford University

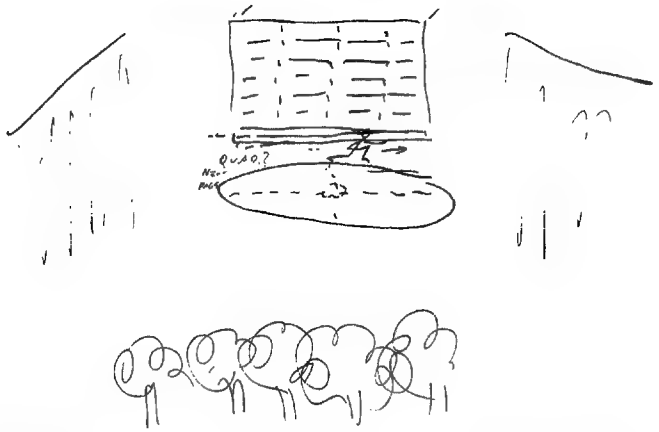


FIGURE 4 FIRST EXPERIMENT WITH VISITING PHYSICS PROFESSOR: "THERE ARE WIDE STEPS RUNNING THE ENTIRE WIDTH OF THE STRUCTURE.... I SEE AN OVAL POOL IN FRONT OF THE STEPS AS I MOVE BACK.... AND THERE COULD BE A SMALL STRUCTURE IN THE MIDDLE OF IT LIKE A CROSS-SHAPED OBJECT.... ON THE GROUND I STILL SEE SOME KIND OF QUADRILATERAL."

After logging off the computer, the outbound experimenter would use a random number generator to determine which of six locations in New York City would constitute the target to be visited in this experiment. Neither the subject nor the experimenter at SRI knew the contents of the target list that was compiled just before the experiment. Having selected a target location by the random protocol, the experimenter would proceed directly to the site and remain there for fifteen minutes.

One-half hour after breaking computer links, the subject would begin to type impres-

sions into a special computer file established for this purpose.

When the New York City experimenter returned to his hotel from his target site, he would make use of a limited-access file to enter his description of the place he actually visited. He would then return to the executive level of the computer, and await the appearance of the SRI experimenters who could then (and only then) link terminals. At that time both files would be printed out on both terminals and the subject and the experimenter would each learn what the other had written.

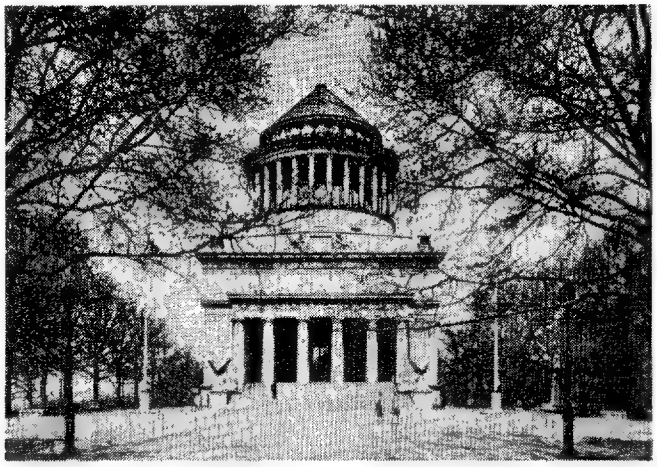
Two subjects, both in California, participated simultaneously in this experiment with the first of two New York City targets. The first of the two New York City targets was Grant's Tomb. Both subjects independently provided computer-stored records of their impressions, and one made the sketch shown in Figure 5. (The five possible targets in addition to Grant's Tomb were a railroad bridge, the 20-story New York University law library, the fountain in Washington Square Park, the Columbia University subway station, and the 72nd Street boat basin. The targets were chosen to be dissimilar, and thus differentiable, by potential judges.)

The first subject, an SRI systems analyst, said in his opening paragraph: "Outdoors, large open area, standing on and then off asphalt (rough material), dark for a path. A white building, like a ticket booth. Wooden structure, is white in color, and has an arched look about it. There is a large shade tree close to Russ (outbound experimenter)."

The second subject, a medical student closeted in a separate SRI location, began with: "I thought of a high place with a view. I saw a tree on your left. A brick plaza seemed to be in front of a building you were entering. I could not clearly identify the activity. A restaurant? A museum? A bookstore? You had coins in the palm of your hand, maybe giving some to Nicky (son of outbound experimenter)."

The coins were in fact used to purchase the postcard from which Figure 5 was made, and they were given to the experimenter's son who made the purchase. Both subjects then went on for an additional paragraph to describe details of the activities they imagined to be going on inside the building they saw, details that were partly correct, partly incorrect.

In the second experiment, the target, again chosen by random protocol, was the fountain in Washington Square Park. One subject participated. She produced an exceptionally accurate transcript. The photos and the subject's drawing of the fountain are shown in Figure 6. The



Grant's Tomb Target in New York City

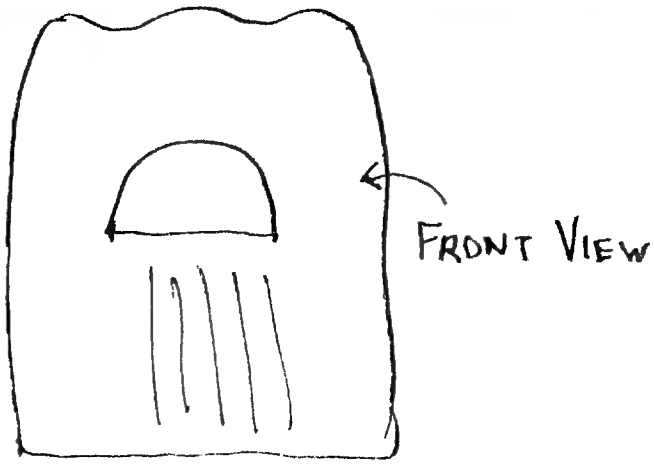
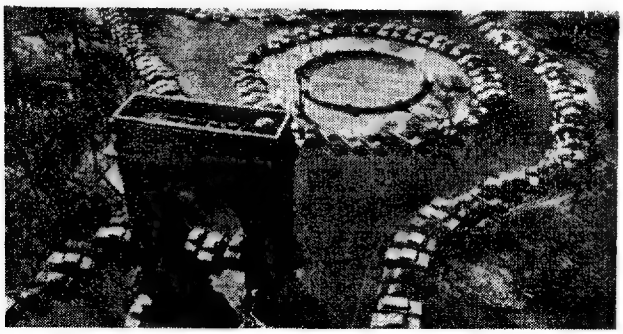
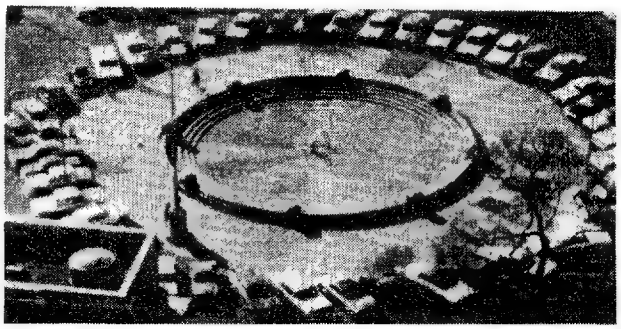
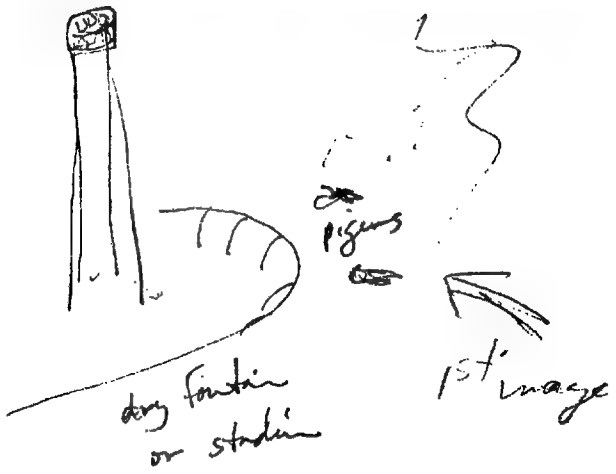


FIGURE 5 COAST-TO-COAST REMOTE VIEWING EXPERIMENT. SUBJECT DESCRIBED: "OUTDOORS, LARGE OPEN AREA.... SHADE TREES.... WHITE BUILDING WITH ARCHES."

subject began her printout with the following: "The first image I got at about the first minute was of a cement depression--as if a dry fountain with a cement post in the center or inside. There seemed to be pigeons off to the right, flying around the surface out of the depression . . . At one point I thought you were opening a cellophane bag . . ." (The experimenter had in fact bought ice cream during the experimental period.) "There was also a rectangular wooden frame, a window frame, but I wasn't sure if it was on a building, or a similar structure with a different purpose." (A possible correlation from a functional viewpoint to the Washington Square Arch through which the outbound experimenters viewed the fountain toward the end of the experimental period.) "All in all I thought you were at Riverside Park . . ." (Incorrect analysis.) An SRI scientist, familiar







Subject's Perception was of a "Cement Depression — as if a Dry Fountain — with a Cement Post in the Center or Inside."

FIGURE 6 COAST-TO-COAST REMOTE VIEWING EXPERIMENT WITH TARGET AT WASHINGTON SQUARE IN NEW YORK CITY

with the New York City area but blind to the target, did, however, identify the target correctly on reading the twenty lines of printout as it emerged from the computer terminal.

As an example of the style of narrative generated by a subject during a computer teleconferencing experiment, we include the entire unedited computer-logged text of the Washington Square experiment below (Figure 7).

These teleconferencing experiments provide an elegant demonstration of the utility of the teleconferencing process as a secure data recording system useful in real-time monitoring of long-distance remote viewing experiments.

In a more detailed tape recording she made after the experiment, but before any feedback, she described "cement steps going into the depression, like a stadium, and the rounded edge of the top of the depression as you go up to ground level." These descriptions not only are correct but also show remarkable detail.

New York-Ohio

A third long-distance remote viewing experiment was carried out under the control of an independent, skeptical scientist. In this case, both SRI experimenters visiting in Ohio agreed to take part in a remote viewing experiment in which our host would select the target.

Under the observation of our challenger, we telephoned one of our subjects, Hella Hammid, in New York City and obtained her agreement to participate in a long-distance remote viewing experiment. She was told only that we were located somewhere between New York City and our California laboratory and that shortly we would be taken to a target that we would like her to describe. The time for the experiment was set for 2:00 PM EDT. We also agreed to call her again at 3:00 PM EDT to obtain her impressions and to give her our feedback as to the actual target.

The scientist took us directly to Springfield, Ohio, to the Ohio Caverns that he had chosen as the target location (see Figure 8).

TYPE (MESSAGE SEQUENCE) 6
(MSG. # 6, 1730 CHARS)
DATE: 6 JUL 1976 1354-PDT
FROM: TARG
SUBJECT: SUSANS REPORT PART 2 NYC EXP

THE FIRST IMAGE I GOT AT ABOUT THE FIRST MINUTE WAS OF A CEMENT DEPRESSION - AS IF A DRY FOUNRTAIN - WITH A CEMENT POST IN THE CENTER OR INSIDE . THERE SEEMED TO BE PIGEONS OFF TO THE RIGHT, FLYING AROJNDTHE SURFACE OUT OF THE DEPRESSION. THEN I SAW AS IF IFIF IN THE DISTANCE A REAL" STADIUM WITH GRASS IN THE CENTER AND PERHAPS STADIUM LIGHTS. OTHER IMAGES WERE AROW OF HOUSES/APICKET FENCE - SOME VERTICAL UNITS WITH JAGGED TOPS. THEN A FLUTED/GROOVED VERTICAL COLUMN, BUT I COULDN'T SENSE WAHT IT WAS RELATED TO. AGAIN YOU WERE IN A DEPRESSED AREA WITH CEMENT SIDES, LOOKING OUT ONTO THE SURFACE OUTSIDE. THE CEMENT SIDES ARE NOT STRAIGHT, BUT SLOPING, ALMOST S-SHAPRD. ALSO A CLEAR FEELING OF THE HEAVY, WORN METAL BAR ON THE TOP OF TYPICAL NYC OR ANYCITY FENCES. THERE DIDN'T SEEM TO BE ANYTHING REALLY SPECIAL INSIDE, JUST A SEPARATION BETWEEN TEWO TWO SIMILAR AREAS. AT ONE POINT, I THOUGHT YOU WERE OPENING A CELLOPHANE BAG AND LATER I SENSED YOU FEEDING POPCORN - TO PIGEONS. THERE WAS ALSO A RECTANGULAR WOODEN FRAME, A WINDOW FRAME, BUT I WASN'T SURE IF IT WAS ON A BUILDING, OR A SIMILAR STRUCTURE WITH A DIFFERENT PURPOSE. ALL IN ALL, I THOUGHT YOU WERE IN RIVERSIDE PARK NEAR A TRACK AND PLAY AREA, OCCASIONALLY LOOKING UP AT THE "ROCK AND LEAF" CLIFFS LEADING UP TO THE DRIVE. AFTER I HAD THOUGHT THAT AND FIT IT IN T WITH THE IMAGES RECEIVED SO FAR, IT KIND OF STUCK, AND I POSSIBLY GENERATED MORE PARK SCENES. THE STADIUM /FOUN TAIN IMAGES WERE THE FIRST AND THUS THE LEAST BJIASED AS TO PARK MEMORIES. (I SURE DO LIKR THE TLELETYPE. IT CAN BECOME AN OBSESSIVE PASTIME, I SEE).

THAT WAS MESSAGE 6

FIGURE 7 COMPUTER FILE PRINTOUT. CALIFORNIA-NEW YORK LONG DISTANCE REMOTE VIEWING. TARGET: WASHINGTON SQUARE (NYC).

We entered the grounds through an entrance arch, that opens onto an enormous expanse of lawn, perhaps twenty acres. The caves are located at a depth of ≈ 150 ft and are entered through a small building having a long flight of steep stairs. Once underground, we walked through a maze of rock-lined tunnels that lead eventually into a series of rooms lined with calcite stalagtites and stalagmites, frosty white and beige crystals formed like icicles. The entire cavern is illuminated by small electric light bulbs attached to the walls. After a forty-five minute walk, we exited the caves through a large metal door giving access to a square cross-sectional shaft with stairs leading to the surface.

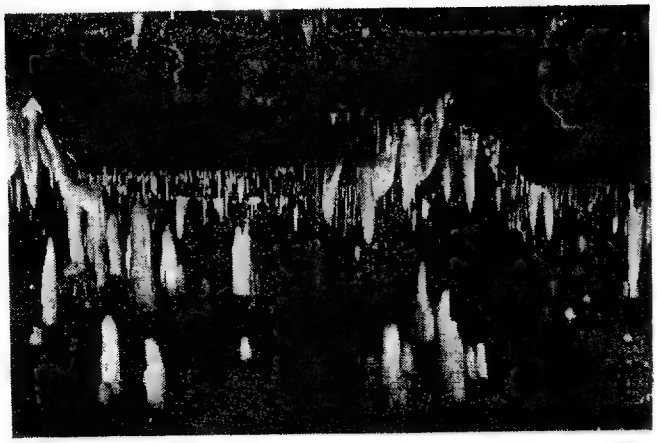


FIGURE 8 OHIO CAVES: DESCRIBED BY SUBJECT IN NEW YORK AS, "UNDERGROUND CAVES OR MINES.... DEEP SHAFTS.... DARKER, COOL, MOIST EARTH-SMELLING PASSAGES."

Following the experimental period, the scientist observer called the subject in New York, forty-five minutes after we left the caves. The opening statements of the subject's transcript as dictated over the phone and posted to the SRI experimenters is as follows:

"1:50 PM before starting--
Flat semi-industrial countryside with mountain range in background and something to do with underground caves or mines or deep shafts--half man made, half natural--some electric humming going on--throbbing, inner throbbing. Nuclear or some very far out and possibly secret installation--corridor--mazes of them--whole underground city almost--Don't like it at all--long for outdoors and nature. 2:00 PM--(Experimenters) R and H walking along sunny road--entering into arbor-like shaft--again looks like man helped nature--vines (wisteria) growing in arch at entrance like to a wine cellar--leading into underground world. Darker earth-smelling cool moist passage with something grey and of interest on left of them--musty--sudden change to bank of elevators--a very man-made steel wall--and shaft-like inverted silo going deep below earth--brightly lit . . ."

She concludes with

"I see a lot of gold and metal and silver-gold glow all over--not much sound--very silent factory--scary--few people--very special."

As is often the case, one observes that the basic gestalt of the target site is cognized and even experienced, while specifics are misinterpreted.

New Orleans-California

Two experiments carried out between New Orleans and Menlo Park, CA, constitute the latest members of the long-distance series, five experiments of which have been completed to date (all reported here). These were carried out with the two subjects who had participated in the New York-California experiments.

During an extensive cross-country trip, we arranged to conduct two experiments between New Orleans and Menlo Park, CA, one each way. The Menlo Park subject was not told in what city the outbound experimenter was located. He knew only that the outbound experimenter was in the central time zone.

For the first experiment (subject in Menlo Park) it was agreed that at 12:00 noon CST on a particular day, the outbound experimenter would choose a target location in his city by random protocol and remain there for the required fifteen minutes. During this time, the subject in Menlo Park would tape-record his impressions and make any drawings that seemed appropriate. (The ARPA net was not available because of computer net malfunction.)

The target chosen by randomized entry into a New Orleans guide book list was the Louisiana Superdome. The outbound experimenter tape-recorded the following description as he looked at the building. "It is a bright sunshine day. In front of me is a huge silvery building with a white dome gleaming in the sun. It is a circular building with metal sides. It looks like nothing so much as a flying saucer. The target is in fact the 80,000-seat Louisiana Superdome stadium."

The subject in Menlo Park described the target as "a large circular building with a white dome." He also expressed feelings of wanting to reject what he saw because the dome looked to him "like a flying saucer in the middle of a city." Some appreciation for this perception can be obtained from Figure 9 in which the target is shown, together with the sketches that the subject made.

The most recent experiment in this series involved a subject in New Orleans viewing activities of a group of three people known to her, at a location in the Palo Alto/Menlo Park area 2000 miles away. Her principal impression was of a "overhang of a building over their heads . . . also a round gold rim around a sunken depression." The target, a bank building is shown in Figure 10. Principal features of the target include a dramatic building overhang, and a rectangular concrete depression with a fountain in which the water comes out of a circular gold rim. The subject also reported "some kind of fake china flowers mushrooming out of the depression." There were four orange lamps mounted on the gold rim. Finally, she reported "there was a projectile coming toward David (one of the outbound experimenters). Like a ball or frisbee, as if Elizabeth (another experimenter) has tossed him a ball." Actually the experimenters had found a paper airplane lying on the ground and had thrown it back and forth for some period of time. In fact, the photo of the site taken at the time of the experiment shows the airplane between them. This is one of the few times that a remote viewing subject has perceived rapid motion at the target site.

The results obtained to date in the long-distance remote viewing series appear to be roughly of the same caliber as those obtained in local remote viewing experiments. The descriptions not only contain correct information beyond that expected by chance, but also show remarkable detail and resolution. Although extensive data must be taken before a final conclusion can be reached, we are led to conclude at this point that there is little, if any, degradation in quality of perception as the subject-target distance is increased from a few

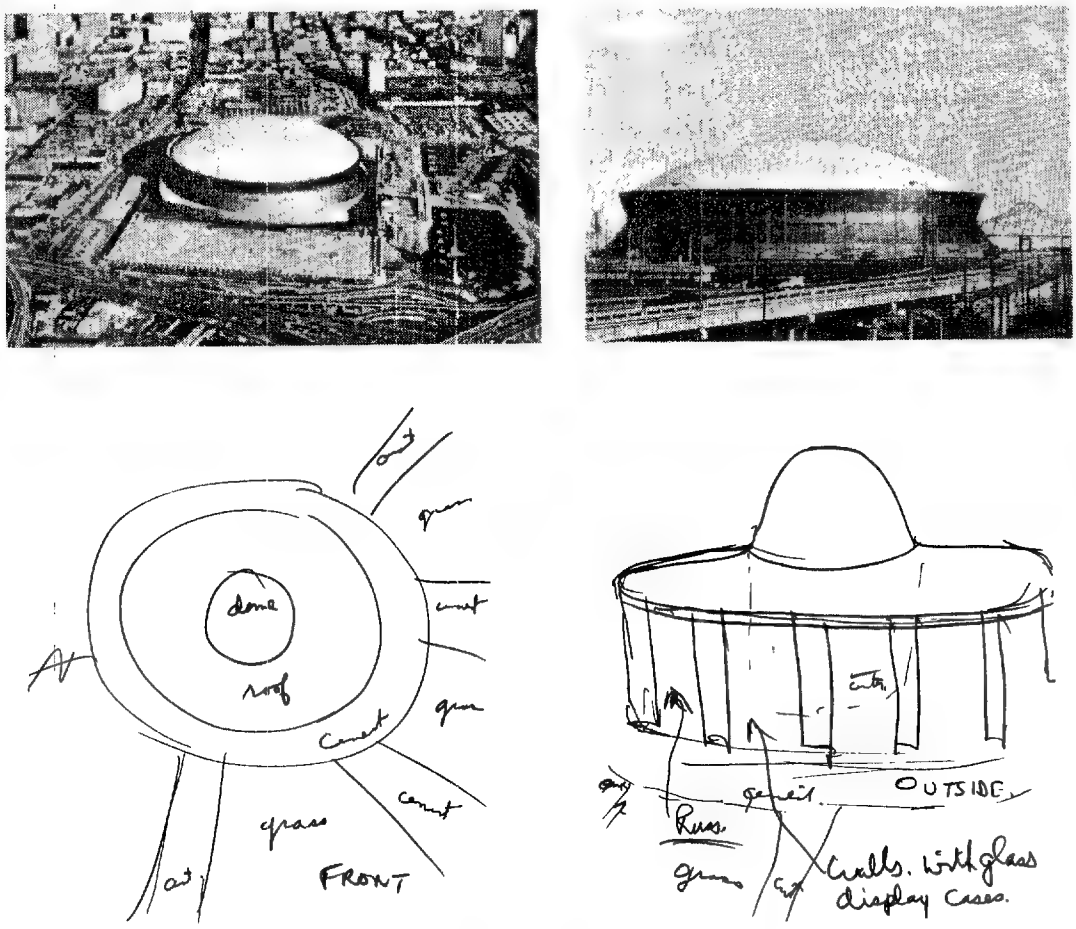


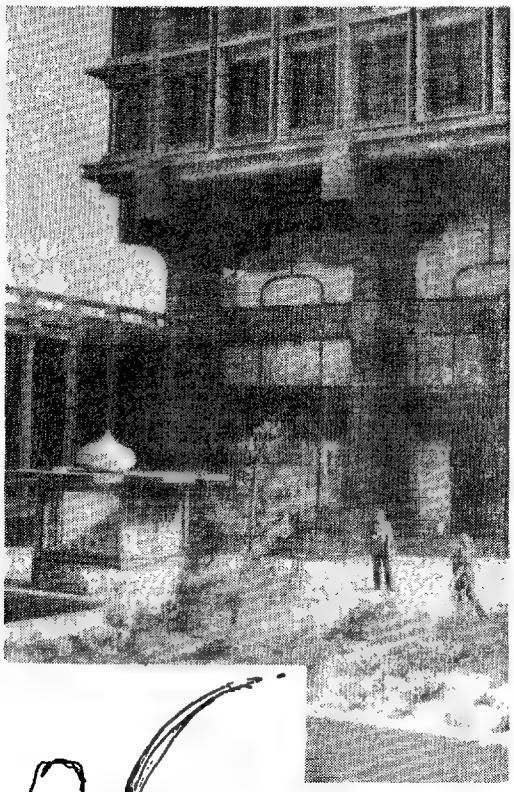
FIGURE 9 LONG DISTANCE REMOTE VIEWING EXPERIMENT — SRI, MENLO PARK, TO LOUISIANA SUPERDOME. SUBJECT DESCRIBED LARGE CIRCULAR BUILDING WITH A WHITE DOME. 31 OCTOBER 1976.

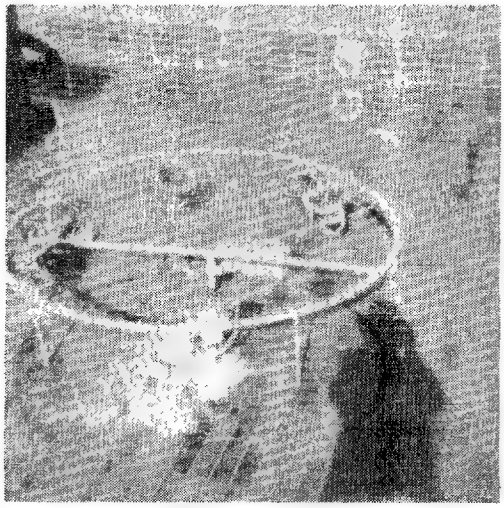
miles to transcontinental distances. The results obtained on the basis of viewing a New York site from SRI in Menlo Park, California, three thousand miles away, for example, are similar to those obtained in local remote viewing experiments. Any theory of paranormal functioning put forward at this time should take this insensitivity to distance into account.

PRINCIPLES OF PHYSICS POTENTIALLY APPLICABLE TO PSI PHENOMENA

One of the common objections to the existence of so-called paranormal functioning is that it would seem to be in conflict with the laws of physics. Our investigations, however, have led us to the contrary view that the data can in all probability be accounted for either within the framework of physics as presently understood, or within the framework of extrapolations that have been proposed to account for other (non-psychic) data. In fact, we anticipate that not only can we use physical principles to help us understand psi phenomena, but the psi data base will probably shed light on some of the current problems in physics, e.g., with regard to the foundations of quantum theory, and for geometrical models of space-time events such as exist in relativity theory. In this section we outline how we are making use of our experimental data base to deduce the relevant physical principles and laws that govern psi functioning.

In addition to attempting to determine whether psi phenomena are generally compatible with the laws and content of physics as presently codified, we are also examining the limits of specific physical theories in modeling psi phenomena. The areas of physics we have under consideration as potentially relevant to modeling psi phenomena include: the possibility that remote viewing is mediated by extremely low-frequency (ELF) electromagnetic waves;[12-17] the possible significance for remote viewing of Bell's theorem[18] and the Einstein-Podolsky-Rosen





Circular Fountain in
Concrete Depression

FIGURE 10 REMOTE VIEWING EXPERIMENT — NEW ORLEANS TO PALO ALTO, 30 OCTOBER 1976. SUBJECT DESCRIBED: "THE OVERHANG OF A BUILDING OVER THEIR HEADS," ALSO "A ROUND GOLD RIM AROUND A SUNKEN DEPRESSION" .... "IN THE SURFACE OF THE DEPRESSION THERE IS SOME KIND OF FAKE CHINA FLOWERS. IT'S LIKE A BONSAI TREE MUSHROOMING OUT OF THE SURFACE." LATER IN THE TRANSCRIPT SHE SAID "THERE WAS A PROJECTILE COMING TOWARD DAVE. SOME KIND OF A PROJECTILE, LIKE A BALL OR FRISBEE. AS IF ELIZABETH TOSSED HIM A BALL." (IT WAS A PAPER AIRPLANE.)

(EPR) paradox[19] of quantum theory which emphasize that "no theory of reality compatible with quantum theory can require spatially separated events to be independent,"[20] but must permit interconnectedness of distant events in a manner that is contrary to ordinary experience[21-22] (experimentally confirmed at the microscopic level);[23-24] the proper interpretation of the effect of an observer (consciousness) on experimental measurement,[25-26] of possible significance in psychokinesis; the possibility that the causality-reversing tachyon[27] or advanced-potential solutions of physics may play a role in precognition;[28-30] the potential relevance (for a general theory of psi phenomena) of theories based on geometries which provide for a more extended structure of the space-time metric.* To indicate the tenor of our approach, let us consider briefly two examples from this list.

A reasonable first hypothesis is that remote viewing is mediated by extremely low-frequency (ELF) electromagnetic waves, a hypothesis that does not seem to be ruled out by any obvious physical or biological facts.

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*We wish to acknowledge the technical contributions of Elizabeth A. Rauscher, a consultant to SRI on leave from Lawrence Berkeley Laboratory, who has done extensive research on physical theories relevant to psi functioning; in particular, work on multidimensional geometries.

This hypothesis, put forward by I. M. Kogan of the Soviet Union, suggests that information transfer under conditions of sensory shielding is mediated by ELF waves with wavelengths in the 300 to 1000-km region.[12-15] Experimental support for the hypothesis is claimed on the basis of: less than inverse square attenuation with distance, compatible both with earth-ionosphere waveguide mode trapping, with source-percipient distances lying in the induction field range as opposed to the radiation field range; observed low bit rates (0.005-0.1 bits/s) compatible with the information carrying capacity of ELF waves; apparent ineffectiveness of ordinary electromagnetic shielding as an attenuator; and standard antenna calculations entailing biologically generated currents yielding results compatible with observed signal-to-noise ratios.

On the negative side with regard to a straightforward ELF interpretation as a blanket hypothesis are: (a) apparent high-resolution, real-time descriptions of remote activities in sufficient detail to require a channel capacity in all probability greater than that allowed by a conventional modulation of an ELF signal; (b) lack of a proposed mechanism for coding (and decoding) the information onto the proposed ELF carrier; and (c) apparent precognition data. The hypothesis must nonetheless remain open at this stage of research, since it is conceivable that counterindication (a) may eventually be circumvented on the basis that the apparent high resolution and high bit rate results from a mixture of low bit rate input and high bit rate "filling in the blanks" from imagination; counterindication (b) is common to a number of normal perceptual tasks and may therefore simply reflect a lack of sophistication on our part with regard to perceptual functioning,[29] and counterindication (c) may be accommodated by an ELF hypothesis if advanced waves as well as retarded waves are admitted.[29,32]

Experimentation to determine whether the ELF hypothesis is viable can be carried out by the use of ELF sources as targets, by the study of parametric dependence on propagational directions and diurnal timing, by experimentation under unusual conditions of shielding (e.g., in a submarine), and by the exploration of interference effects caused by creation of a high-intensity ELF environment during experimentation. All of these are under consideration in our laboratory and elsewhere.

Because of the apparent difficulties with the ELF hypothesis, especially in accounting for the relatively high resolution and data rate of paranormal perception, serious consideration is being given to alternative mechanisms. A more speculative, but promising, hypothesis, which could in principle account for both remote viewing and precognition, was developed in conjunction with Gerald Feinberg of Columbia University. It is proposed that the ordinary Minkowski 4-space (three spatial, one temporal coordinates) might simply be the real part of an eight-dimensional complex space-time. For this generalized coordinate model we let the spatial coordinates $x \rightarrow x + ix'$, and similarly for time, $t \rightarrow t + it'$. Analogous to the expression for the square of the distance between two points in Minkowski 4-space,

$$\Delta s^2 = \Delta x^2 - c^2\Delta t^2 \quad ,$$

we take the corresponding expression in the complex 8-space to be

$$\Delta s^2 \equiv \Delta s \Delta s^* = \Delta x^2 + \Delta x'^2 - c^2\Delta t^2 - c^2\Delta t'^2 \quad .$$

With regard to modeling remote viewing in real time ($\Delta t = 0$), we can construct situations in which the remaining first, second, and fourth terms in the above equation add to zero ($\Delta s = 0$). Therefore, even though there is an ordinary (3-space) separation Δx between the two points, the distance in the complex 8-space is reduced to zero. Under the hypothesis that the imaginary (primed) coordinates are accessible to consciousness, reduction of the 8-space separation to zero could in principle provide for a coupling between remote viewer and target site. Given the additional geometrical channels provided by this model, a similar argument can be mounted to account for precognition ($\Delta s = 0$ for $\Delta t < 0$). We thus have the possibility of a geometrical interpretation of the "Quantum Interconnectedness" principle by which events remote in spacetime are nonetheless connected by non-local correlations,[22-24] or, in this interpretation, by the nature of the fabric of spacetime itself.

We are presently pursuing the implications of these and other models. Our goal in these investigations is to develop a theoretical structure to account for the data at hand, and to predict new, testable experimental outcomes.

CONCLUSIONS

In this paper we have described our investigation of particular aspects of paranormal functioning of human subjects. Specifically, we have examined the human capability to access and describe, by mental processes, information sources blocked from ordinary perception by reason of distance and shielding. We have found remote sensing to be a robust phenomenon in which experienced and inexperienced subjects are able to describe in words and drawings both the location and actions of experimenters placed at undisclosed sites at varying distances from the subjects.

From over seventy experiments with remote sensing, we have obtained three principal findings. First, we have established that it is possible to acquire significant amounts of information about remote locations. Second, the physical distance separating the subject from the scene--even distances ranging over thousands of kilometers in recent transcontinental experiments--does not appear to lessen the accuracy of the perception. Third, the use of Faraday cage electrical shielding does not in any apparent way degrade the quality of the description obtained.

One of the purposes of our research is to make use of the remote perception experimental data base to deduce the relevant physical principles and laws that govern paranormal functioning. In pursuit of this goal we are endeavoring to define the level of compatibility of paranormal phenomena with the laws of physics as presently understood and to examine the limits of specific physical theories in modeling these phenomena. To this end, we have considered some physical models potentially applicable to remote perception, but further investigation must be pursued. Therefore, we plan to continue our research efforts in the belief that not only can we use physical principles to help bring about an understanding of psi phenomena, but we anticipate that the psi data base may make a contribution toward the clarification of certain existing problems in physics.

REFERENCES

1. Russell Targ and Harold Puthoff, "Information transfer under conditions of sensory shielding," Nature, vol. 252, pp. 602-607, October 18, 1974.

2. Harold Puthoff and Russell Targ, "A Perceptual channel for information transfer over kilometer distances: Historical perspective and recent research," Proc. IEEE, vol. 64, pp. 329-354, March 1976.

3. Russell Targ and Harold Puthoff, Mind-Reach. New York: Delacorte Press, 1977.

4. Arthur Hastings and David Hurt, "A confirmatory remote viewing in a group setting," Proc. IEEE, vol. 64, October 1976.

5. Thomas Whitson, David Bogart, John Palmer, and Charles Tart, "Preliminary experiments in group remote viewing," Proc. IEEE, vol. 64, October 1976.

6. Jacques Vallee, Arthur Hastings, and Gerold Askevold, "Remote viewing experiments through computer conferencing," Proc. IEEE, vol. 64, October 1976.

7. John Bisaha and B. J. Dunne, "Precognitive remote viewing in the Chicago area, a replication of the Stanford experiment," Research in Parapsychology 1976. Metuchen, NJ: The Scarecrow Press Inc. (in press).

8. J. Ehrenwald, "Cerebral localization and the psi syndrome," J. of Nervous and Mental Disease, vol. 161, No. 6, pp. 393-398.

9. R. Ornstein, The nature of human consciousness. San Francisco, CA: Freeman, 1973, Ch. 7 and 8.

10. R. W. Sperry, "Cerebral organization and behavior," Science, vol. 133, pp. 1749-1757, 1961.

11. K. Osis, "New ASPR research on out-of-the-body experiences," ASPR Newsletter, No. 14, Summer 1972.

12. I. M. Kogan, "Is telepathy possible?," Radio Eng., vol. 21, p. 75, January 1966.

13. _____, "Telepathy, hypotheses and observations," Radio Eng., vol. 22, p. 141, January 1967.

14. _____, "Information theory analysis of telepathic communication experiments," Radio Eng., vol. 23, p. 122, March 1968.

15. _____, "The information theory aspect of telepathy," RAND Publ. P-4145, Santa Monica, CA, July 1969.

16. M. A. Persinger, "Geophysical models for parapsychological experiences," Psychoenergetic Systems, vol. 1, No. 2, pp. 63-74, 1975.

17. _____, "The paranormal--P. II: Mechanisms and models," M.S.S. Information Corp., New York, 1974.

18. J. S. Bell, "On the problem of hidden variables in quantum theory," Rev. Mod. Phys., vol. 38, no. 3, p. 447, July 1966.

19. A. Einstein, B. Podolsky, and N. Rosen, "Can quantum-mechanical description of physical reality be considered complete?," Phys. Rev., vol. 47, p. 777, May 15, 1935.

20. H. Stapp, "Theory of reality," Lawrence-Berkeley Lab. Rep. LBL-3837, Univ. of California, Berkeley, April 1975.

21. R. H. Dicke and J. P. Wittke, Introduction to Quantum Mechanics. Reading MA: Addison-Wesley, 1960, Ch. 7.

Approved For Release 2002/05/17 : CIA-RDP96-00787R000500060001-2

22. D. J. Bohm and B. J. Hiley, "On the intuitive understanding of non-locality as implied by quantum theory," Foundations of Physics, vol. 5, pp. 93-109, 1975.

23. J. J. Freedman and J. F. Clauser, "Experimental test of local hidden variable theories," Phys. Rev. Lett., vol. 28, No. 14, p. 938, April 3, 1972.

24. J. F. Clauser and M. A. Horne, "Experimental consequences of objective local theories," Phys. Rev. D, vol. 10, No. 2, p. 526, July 15, 1974.

25. E. P. Wigner, "The problem of measurement," Amer. J. Phys., vol. 31, No. 1, p. 6, 1963.

26. E. H. Walker, "Foundations of paraphysical and parapsychological phenomena," in Proc. Conf. Quantum Physics and Parapsychology (Geneva, Switzerland), New York: Parapsychology Foundation, 1975.

27. G. Feinberg, "Possibility of faster-than-light particles," Phys. Rev., vol. 159, p. 1089, 1967.

28. J. A. Stratton, Electromagnetic Theory. New York: McGraw-Hill, 1941.

29. G. Feinberg, "Precognition--A memory of things future?," in Proc. Conf. Quantum Physics and Parapsychology (Geneva, Switzerland), New York: Parapsychology Foundation, 1975.

30. O. Costa de Beauregard, "Quantum paradoxes and Aristotle's twofold information concept," in Proc. Conf. Quantum Physics and Parapsychology (Geneva, Switzerland), New York: Parapsychology Foundation, 1975.

31. B. Julesz, Foundations of cyclopean perception. Chicago, IL: Univ. of Chicago Press, 1971.

32. H. Puthoff and R. Targ, in Psychic Exploration--A Challenge for Science, J. White, Ed. New York: Putnam, 1974, pp. 522-542.

POSSIBLE EEG CORRELATES TO REMOTE STIMULI UNDER CONDITIONS OF SENSORY SHIELDING

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ABSTRACT

We have investigated the ability of certain individuals to perceive remote (faint) stimuli at a noncognitive level of awareness. To investigate this we have looked for systematic changes in a subject's brainwave (EEG) production occurring at the same time as light flashes are generated on a random schedule in a remote laboratory. Although we have found in this investigation that significant correlations appear to exist between the times of light flashes and the times of brainwave alterations, we consider these data to be only suggestive, with a definitive result requiring further experimentation.

INTRODUCTION

In a number of laboratories evidence has been obtained indicating the existence of an as-yet-unidentified channel wherein information is coupled from remote electromagnetic stimuli to the human nervous system as indicated by physiological response, even though overt responses such as verbalizations or key presses provide no evidence for such information transfer. Physiological measures have included plethysmographic response[1] and EEG activity.[2,3] Kamiya, Lindsley, Pribram, Silverman, Walter, and others have suggested that a whole range of EEG responses such as evoked potentials (EPs), spontaneous EEG, and the contingent negative variation (CNV) might be sensitive indicators of the detection of remote stimuli not mediated by usual sensory processes.[4]

A pilot study was therefore undertaken at SRI to determine whether EEG activity could be used as a reliable indicator of information transmission between an isolated subject and a remote stimulus. Following earlier work of others, we assumed that perception could be indicated by such a measure even in the absence of verbal or other overt indicators.

To aid in selecting a stimulus, we noted that Silverman and Buchsbaum attempted, without success, to detect EP changes in a subject in response to a single stroboscopic flash stimulus observed by another subject.[5] Kamiya suggested that because of the unknown temporal characteristics of the information channel, it might be more appropriate to use repetitive bursts of light to increase the probability of detecting information transfer.[6] Therefore, in our study we chose to use repetitive light bursts as stimuli.[7-9]

PILOT STUDY AT SRI

In the design of the study it was assumed that the application of remote stimuli would result in responses similar to those obtained under conditions of direct stimulation. For example, when normal subjects are stimulated with a flashing light, their EEG typically shows a decrease in the amplitude of the resting rhythm and a driving of the brain waves at the frequency of the flashes.[10] We hypothesized that if we stimulated one subject in this manner (a putative sender), the EEG of another subject in a remote room with no flash present (a receiver), might show changes in alpha (8-13 Hz) activity, and possibly EEG driving similar to that of the sender, either by means of coupling to the sender's EEG, or by coupling directly to the stimulus.

We informed our subject that at certain times a light was to be flashed in a sender's eyes in a distant room, and if the subject perceived that event, consciously or unconsciously, it might be evident from changes in his EEG output. The receiver was seated in a visually opaque, acoustically and electrically shielded double-walled steel room located approximately 7 m from the sender's room.

We initially worked with four female and two male volunteer subjects. These were designated "receivers." The senders were either other subjects or the experimenters. We decided beforehand to run one or two sessions of 36 trials each with each subject in this selection procedure, and to do a more extensive study with any subject whose results were positive.

A Grass PS-2 photostimulator placed about 1 m in front of the sender was used to present flash trains of 10 s duration. The receiver's EEG activity from the occipital region (Oz), referenced to linked mastoids, was amplified with a Grass 5P-1 preamplifier and associated driver amplifier with a bandpass of 1-120 Hz. The EEG data were recorded on magnetic tape with an Ampex SP 300 recorder.

On each trial, a tone burst of fixed frequency was presented to both sender and receiver and was followed in one second by either a 10 s train of flashes or a null flash interval presented to the sender. Thirty-six such trials were given in an experimental session, consisting

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of 12 null trails--no flashes following the tone--12 trials of flashes at 6 f.p.s. and 12 trials of flashes at 16 f.p.s., all randomly intermixed, determined by entries from a table of random numbers. Each of the trials consisted of an 11-s EEG epoch. The last 4 s of the epoch were selected for analysis to minimize the desynchronizing action of the warning cue. This 4-s segment was subjected to Fourier analysis on a LINC 8 computer.

Spectrum analyses gave no evidence of EEG driving in any receiver, although in control runs the receivers did exhibit driving when physically stimulated with the flashes. But of the six subjects studied initially, one subject showed a consistent alpha blocking effect. We therefore undertook further study with this subject. Of our six subjects, this one had by far the most monochromatic EEG spectrum. Figure 1 shows a typical occipital EEG spectrum of this subject.

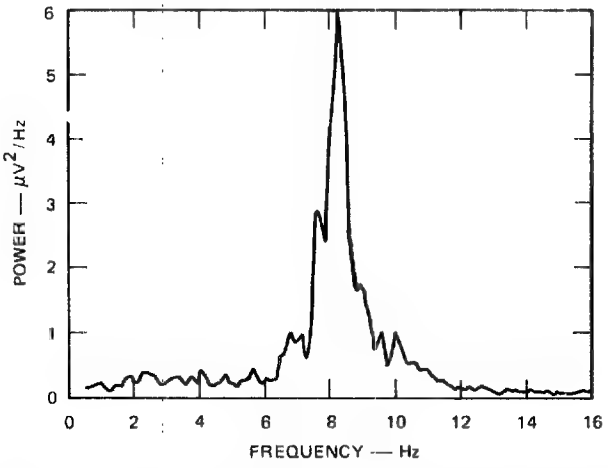

FIGURE 1 TYPICAL POWER SPECTRUM AVERAGED OVER TWENTY 8-SECOND EPOCHS

Data from seven sets of 36 trials each were collected from this subject on three separate days. This comprised all the data collected to date with this subject under the test conditions described above. The alpha band was identified from average spectra; then scores of average power and peak power were obtained from individual trials and subjected to statistical analysis. The final analysis showed that power measures were less in the 16 f.p.s. case than in the 0 f.p.s. in all seven sets of peak power measures and in six out of seven average power measures.

Siegel's two-tailed t approximation to the nonparametric randomization test[11] was applied to the data from all sets, which included two sessions in which the sender was removed. Average power on trials associated with the occurrence of 16 f.p.s. was significantly less than when there were no flashes ($t = 2.09$, d.f = 118, $P < 0.04$). The second measure, peak power, was also significantly less in the 16 f.p.s. conditions than in the null condition ($t = 2.16$, d.f. = 118, $P < 0.03$). The average response in the 6 f.p.s. condition was in the same direction as that associated with 16 f.p.s., but the effect was not statistically significant.

As part of the experimental protocol the subject was asked to indicate conscious assessment for each trial as to which stimulus was generated. The guess was registered by the subject via one-way telegraphic communication. An analysis of these guesses has shown them to be at chance, indicating the absence of any supraliminal cueing, so arousal as evidenced by significant alpha blocking occurred only at the noncognitive level of awareness.

Several control procedures were undertaken to determine if these results were produced by system artifacts or by subtle cueing of the subject. Low level recordings were made from saline of 12 kΩ resistance in place of the subject, with and without the introduction of 10 Hz, 50 μV signals from a battery-operated generator. The standard experimental protocol was adhered to and spectral analysis of the results were carried out. There was no evidence in the spectra associated with the flash frequencies, and the 10 Hz signal was not perturbed.

In another control procedure a five foot pair of leads was draped across the subject's chair (subject absent). The leads were connected to a Grass P-5 amplifier via its high impedance input probe. The bandwidth was set 0.1 Hz to 30 kHz with a minimum gain of 200,000. The output of the amplifier was connected to one input of a C.A.T. 400C "averager." Two-second sweeps, triggered at onset of the tone, were taken once every 13 seconds for approximately two hours, for about 550 samples. No difference in noise level between the fore-period and the onset of flicker was observed.

REPLICATION STUDIES AT LANGLEY PORTER

The next effort was directed toward replication by an independent laboratory of the original SRI study of EEG response to remote strobelight stimuli. Arrangements for replication were made with the Langley Porter Neuropsychiatric Institute, University of California Medical Center, San Francisco.

As a special precaution against the possibility of system artifacts in the form of electromagnetic pickup from the strobelight discharge or associated electronic equipment (e.g., through the power lines), SRI developed an entirely battery-operated package for use as a stimulus generator for the EEG experimentation. It consists of a battery-driven incandescent

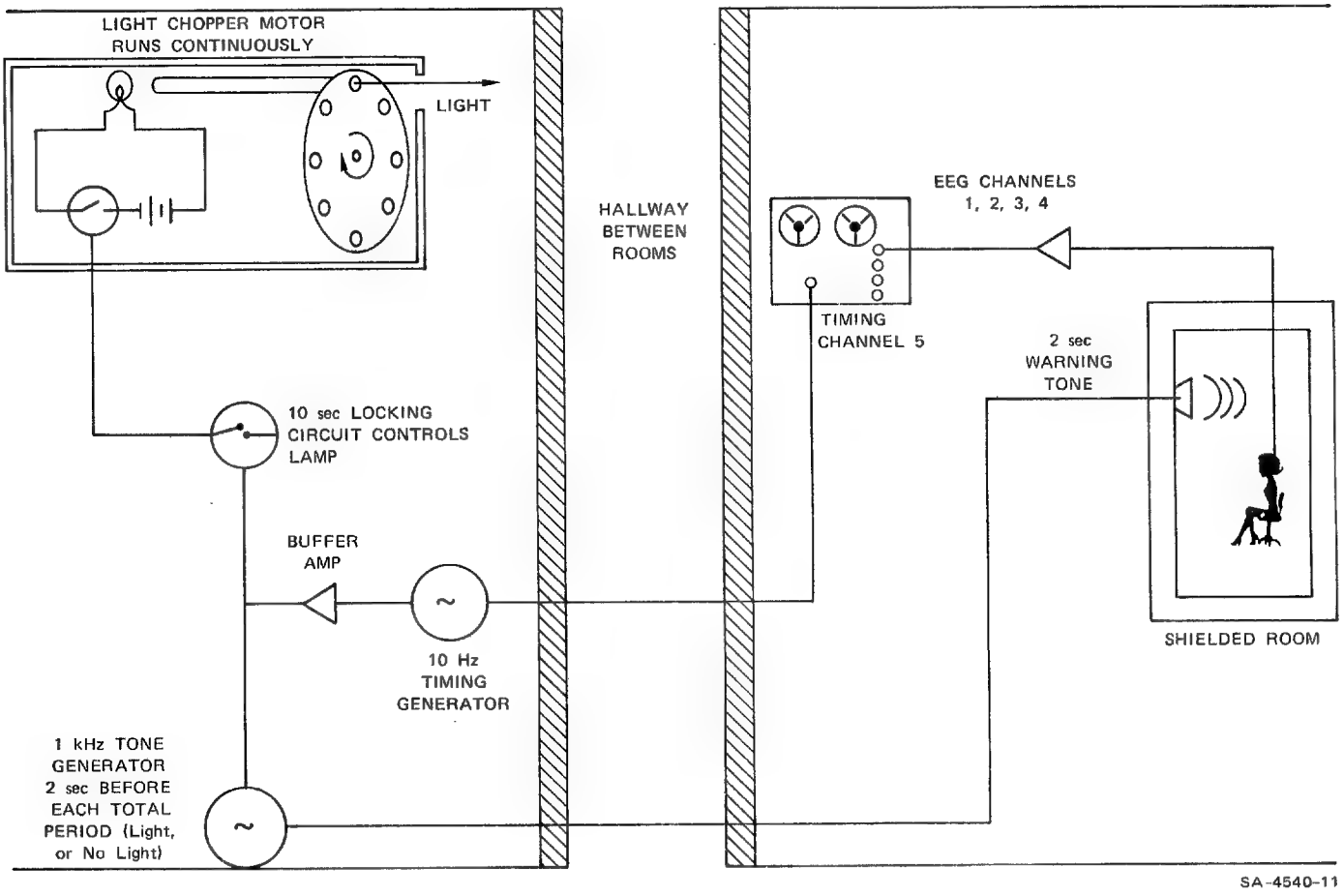

FIGURE 2 SCHEMATIC OF THE REMOTE SENSING EEG EXPERIMENT

lamp, whose CW output passes through a mechanical chopper continuously driven by a battery-driven motor as shown in Figure 2. A 10-Hz timing generator (computer triggered) controls the generation of a 1-kHz warning tone two sec before onset of the experimental period, and also drives a locking circuit that determines the presence or absence of the ten-sec light stimuli, again all battery operated. Thus everything on the left of the diagram of Figure 2 is battery operated and therefore independent of the power line system. Further, replacement of the arc-discharge strobelamp by an incandescent lamp eliminates the possibility of direct subliminal pickup of audio or electrical signals from possible transients associated with the arc discharge or associated electronics.

Description of the EEG Processor

A hardware single channel power spectrum analyzer was constructed from a commercial band-pass filter with corner frequencies of 9.0 and 12.0 Hz, and 48 dB down at 8.0 and 13.0 Hz. Analog multipliers convert the filter output to a signal proportional to in-band power. To confirm that this system is equivalent to the standard FFT analysis used in the pilot study, the analog data of the pilot study was reanalyzed, and the result was found to be consistent with the earlier analysis.

Experimental Protocol

Each experimental session consisted of 40 trials, 20 each for the 0 (no light) and 16 f.p.s. of the remote light stimulus. A trial is defined as a warning tone followed by a 10 second period consisting of a 2 second wait, and two 4 second data collection periods. The trial rate was one trial every 30 ± 1 seconds. The trial sequence was randomized subject to the following conditions: (1) in each group of 10 trials there were equal numbers of each condition, and (2) no more than three in a row of a single type were allowed. Seven 40 trial sequences were made according to this prescription and recorded separately on audio tape. During the session, trials were generated from one of these tapes and the sequence was unknown to the experimenters since the sequence tapes were

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generated one month in advance of the experiments. As in standard EEG protocol, and in accordance with preestablished criteria, certain trials were deleted after the session for three reasons only: artifact, logic circuit failure, or abnormal EEG power. If a trial was rejected, a trial of the opposite stimulus condition was rejected at random from the particular set of 10 trials in question. If more than 10 trials of a given type were rejected from a session, the entire session was deleted. (This occurred twice in each experiment.)

Six channels of EEG and one logic channel taken from the sequence tape were recorded on a multiplexed FM analog tape recorder. The logic on the tape differentiated the trials between flashing and nonflashing conditions.

In pretesting the equipment, we ran the experiment using unselected subjects such as laboratory personnel, in order to test the adequacy of the experiment and to determine whether there were any correlated electronic or mechanical discharges from the apparatus. In 20 sessions of data acquisition, of 40 each (800 trials) there were no significant differences between the null and 16 Hz conditions.

RESULTS

Using the above protocol, two experiments were conducted during a three-month period. For half of the sessions, the subject was asked to press a button when she felt the light was flashing. For the six sessions (105 trials each for the 0 and 16 f.p.s. conditions when she was not asked to overtly indicate her feelings about the light, there was a slight decrease of in-band EEG power measured over the left occipital region of the brain. Similarly, for the six sessions (107 trials each for the 0 and 16 f.p.s. conditions) when she was asked to respond overtly, there was this time a significant decrease of in-band EEG power ($p \leq 0.037$, using an F ratio test derived from a two-way analysis of variance). In considering the experiment as consisting of the combined 212 trials in each stimulus condition regardless of the overt response contingency, we find a statistically significant decrease in in-band EEG power ($p < 0.011$, using F ratio test as above).

During the second experiment, three months later, a different contingency was added to determine if a "sender" was necessary to produce the effect we had observed earlier. For a given session, a random procedure (with equal trials) was used to determine if a person (called the "sender" person) would be looking at the photo-simulator. There was no one present with the photo-stimulator otherwise. For the 7 "non-sender" sessions (121 trials each for the 0 and 16 f.p.s. conditions) we find a statistically significant increase of in-band EEG power measured over the mid-occipital region of the brain ($p < 0.039$ using an F ratio test as above). During the "sender" sessions (123 trials in each stimulus condition) there was a slight increase of in-band EEG power. All together, there was a statistically significant increase of in-band EEG power when the 244 trials were analyzed regardless of "sender" condition ($p < 0.008$ using an F ratio test as above), and there was no significant difference found between "sender"/"no-sender" conditions.

For both experiments, we considered in-band EEG power for the 0-4 second and 4-8 second time periods independently to determine if the effects were time dependent. Although some of these isolated sub-intervals were statistically significant, no systematic relationship emerged. Thus the effect appears to be cumulative over the 8 seconds. The 0-8 second results are summarized in Table 1.

Table 1

SUMMARY OF RESULTS OF THE REPLICATION EXPERIMENTS SHOWING POWER MEANS AND STATISTICAL RESULTS FOR THE VARIOUS EXPERIMENTAL CONDITIONS

	Experiment I			Experiment II		
	Guessing Sessions	Non-Guessing Sessions	Combined	Sender Sessions	Non-Guessing Sessions	Combined
No light flash	957	704	832	854	766	810
Light flash	873	647	761	860	844	852
F ratio	4.39	2.20	6.47	0.017	4.33	7.03
df_1; df_2	1; 202	1; 198	1; 400	1; 232	1; 228	1; 460
$p \leq$	0.037	0.14	0.011	0.90	0.039	0.0083

DISCUSSION

Although our pilot experiment and the two replication studies all showed significant changes in EEG production correlated with the presence or absence of a remote light stimulus, the sign of the systematic change in power in the third study was opposite to that of the first two. We therefore undertook a detailed frequency analysis of the EEG data tapes from the last two experiments, since the pilot experiment had already been subjected to fast-Fourier-transform (FFT) analysis. We conjectured that the observed power change in these experiments might be the result of a very small frequency shift, which could become translated into a large amplitude change due to discriminator action of the alpha-band filter. In a chapter on alpha blocking, Kooi, in his Fundamentals of Electroencephalography says, for example, ". . . attentiveness is associated with a reduction in amplitude and an increase in average frequency of spontaneous cerebral potentials. . . The center frequency of the alpha rhythm may be influenced by the type of ongoing mental activity. Shifts in frequency may be highly consistent as two different tasks are performed alternately." The FFT analysis for the second experiment showed that the average peak EEG power occurred most often near 8 Hz, and thus fell slightly below the hardware summing window (±3 dB at 8.7-12.4 Hz) enhancing a possible discriminator effect. The FFT analysis further showed that there was an overall increase in frequency of peak power but the shift was statistically nonsignificant. This slight shift of 0.11 Hz could possibly account for the observed power increase due to the highly, nonlinear discriminator effects. In examining other portions of the spectrum for further effects, we found that systematic amplitude changes are highly dependent upon where in the frequency spectrum the power sum is taken. This is to be expected since almost all EEG phenomena are known to be strongly frequency dependent.

In the pilot study the frequency region for analysis was centered about the subject's dominant EEG output frequency with bandpass determined by the full width ten-percent power points. In the two replication studies we used hardware filters at this same frequency. FFT analysis showed clearly that if other filter bands had been chosen, significant correlations would not have been found. Thus, although our filter selection was made before the collection of any data, other experimenters might have reasonably chosen other criteria for frequency selection. Therefore, although we have found statistically significant evidence for EEG correlates to remote light flash stimuli, we consider these data to be only suggestive, with a definitive result requiring further experimentation.

REFERENCES

1. E. D. Dean, Int. J. of Neuropsychiatry, Vol. 2, p. 439, 1966.
2. C. T. Tart, Int. J. of Parapsychology, Vol. 5, p. 375, 1963.
3. T. D. Duane and T. Behrendt, Science, Vol. 150, p. 367, 1965.
4. R. Cavanna, Ed., Psi Favorable States of Consciousness. New York: Parapsychology Foundation, 1970.
5. Ibid., pp. 143-169.
6. Ibid., pp. 158-159.
7. R. Targ and H. Puthoff, "Information Transmission Under Conditions of Sensory Shielding," Nature, Vol. 252, No. 5476, pp. 602-607, October 18, 1974.
8. C. Rebert and A. Turner, "EEG Spectrum Analysis Techniques Applied to the Problem of Psi Phenomena," Physician's Drug Manual, Vol. 5, Nos. 9-12, Vol. 6, Nos. 1-8, pp. 82-88, January-December 1974.
9. H. Puthoff and R. Targ, "A Perceptual Channel for Information Transfer Over Kilometer Distances: Historical Perspective and Recent Research," Proc. IEEE, Vol. 64, No. 3, pp. 329-354, March 1976.
10. D. Hill and G. Parr, Electroencephalography: A symposium on its Various Aspects. New York: MacMillan, 1963.
11. S. Siegel, Nonparametric Statistics for the Behavior Sciences. New York: McGraw-Hill, 1956, pp. 152-156.

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AN INVESTIGATION OF SOVIET PSYCHICAL RESEARCH*

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SUMMARY

This paper presents the results of an analysis of Soviet research on the biophysics of parapsychological processes. The study covered Soviet application of statistical theories, research done on electro-statics, the development of remote sensors, hypothesized carrier mechanisms, human sensitivity to magnetic fields, and training to improve performance of subjects. Speculations are made with regard to Soviet research organization and as to the direction of future R&D. For example, it appears that parapsychological investigations in the Soviet Union are conducted under two types of circumstances: first, work that is not officially sanctioned or supported by the Russian government; and second, work that is officially supported and is conducted in a military research laboratory or in a laboratory that is an adjunct to another institution. Finally, some conclusions are drawn concerning Soviet progress in understanding and employing what are considered novel biophysical information transfer mechanisms.

INTRODUCTION

Historically, parapsychological research in the United States and the Soviet Union has been markedly different in approach. The Soviets have generally proceeded from the perspectives of a psychophysiology, which is Pavlovian in origin, and the physical and mathematical sciences, whereas parapsychological research in the U.S. has been largely influenced by early approaches in England and dealt with attempts to convince others that such processes exist. In the recent past, typical research in the United States has attempted to reveal the legitimacy of parapsychology by statistically oriented experimentation based on association theory or by exploration of experimental paradigms that might be more demonstrative, such as exploring telepathy via dreams, sheep versus goat experimental designs, children, receiver characteristics, transmitter characteristics, psi characteristics, etc. Recently, investigators in the United States have become gradually influenced by the apparent successes of their Russian counterparts and in general seem to be commencing to emulate their approach.

On reviewing the Soviet literature, research in novel biophysical information transfer (NBIT) was emphasized. The Soviet literature almost invariably shows interest in the physical and physiological mechanisms. An example is the interest in psychoenergetics, bioplasma, and psychotronics. The term psychotronics was coined by a French journalist after the analogy with electronics, bionics, nucleonics, and others. The Russians have devised their own term--psychoenergetics. These new names were chosen to give the field of study an air of scientific or technological respectability.

A fundamental question remains: does the name imply a basic difference in the approach and, if so, what effects can be expected from it? Judging from the available literature, the name does imply a difference in the approach of the Russian and Czech investigators from that of most Western parapsychologists. Some of the differences are outlined below.

(1) The Russians do not undertake studies like those of J.B. Rhine, in which remote card reading or other simple telepathic tasks are carried out repeatedly to gather statistical evidence. The Russians assume the reality of thought transference. Their best experiments are designed to elucidate the physical basis of these novel biophysical information transfer (NBIT) mechanisms.

(2) Many of the Russian researchers that publish in open literature in this field pursue their studies on their own time and at their own personal expense. They lack the resources to carry out well designed or long statistical studies.

(3) Many Westerners remain convinced that parapsychology will never be explained in terms of physics. They cling to an undertone of a religious-like belief in transcendent mechanisms. The Russians, in contrast, reject such an approach; being doctrinaire materialists, everything has a physical, scientific explanation. Again, this line of reasoning reinforces the trend toward eliciting the physical mechanisms of NBIT.

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* Abstracted from Novel Biophysical Information Transfer (NBIT), AiResearch Report 76-13197.

In reviewing Soviet and Western work on NBIT phenomena, it seems reasonable that serious interdisciplinary research and development is being carried on. Furthermore, there seems to be veridical indication that the Soviets have organized laboratories for just such programs. On the other hand, it is obvious that many Russian workers in this field pursue their research as extracurricular activity, with little or no funding. Thus, there are hints of secret work as well as indication that parapsychological research may be in disfavor. It may be that high quality, systematic research is officially approved, well funded, and well organized, whereas research in this field from "nonofficial" laboratories may be allowed to flounder without funds, thus providing a smoke screen of poor quality work. If the Soviets did indeed establish laboratories for a systematic approach to this problem, in our opinion they are certainly capable of making good progress.

The literature surveyed varies widely in degree of sophistication. Most experimental papers give rather vague descriptions and insufficient data to assess the accuracy and importance of claimed results. Upon completion of the review, the bulk of what was considered to be creditable work was found to be centered around, but not limited to, the activities of three principal individuals--Kogan, Adamenko, and Sergeyev. Of the theoretical papers, those by Kogan are undoubtedly the best and reflect the good thinking of an experienced physicist. Using physically acceptable arguments, Kogan demonstrates the possibility that ELF and VLF carrier waves might be part of NBIT mechanisms, and initiates an information theory approach to the study of NBIT. His ideas are much like those of Persinger.

The papers by Adamenko, on the other hand, are spotty with respect to knowledge of modern physics and physiology. He utilizes a number of poorly defined and unquantifiable concepts such as "bioplasma," "psi energy," etc. Nevertheless, significant contributions are made by him--particularly his study and explanation of telekinesis in terms of electrostatics. The papers by Sergeyev show the effectiveness of a radar signature expert turned to analyzing electrophysiological events. He shows some interesting new possibilities, taking into account that the noise in the signals not only contains statistical random variations, but that the carriers also may have non-stationary drifts. His work also seems to suffer from the lack of an interdisciplinary approach. Furthermore, he is probably responsible for the development of at least one (and perhaps two) remote physiological sensor.

APPLICATION OF STATISTICAL THEORIES TO NOVEL BIOPHYSICAL INFORMATION TRANSFER MECHANISMS

In the field of theoretical statistics, the Russians are usually considered to be ahead of the Western countries. Kolmogorov and his contemporaries did a considerable amount of work in the 1920 to 1945 era, developed many new theories, and applied them to some classical problems, such as Kolmogorov's theory of isotropic turbulence. Directly before and during World War II, Rice, Shannon, and others in the West developed more advanced ideas that are now embedded within information theory and communication theory. However, the Soviets have been the first to apply these ideas and techniques to the field of parapsychology. I. M. Kogan seems to have been the leader in this venture and the known papers by him are good in that he demonstrates a knowledge of these advanced fields, correctly applies the techniques, and reaches some justifiable and creditable conclusions. Kogan seems to have started working on these ideas in the early 60's. Ryzl states that the BioInformation Section of the Scientific Technical Society of Radiotechnique and Electrocommunication was founded in 1965 and that Kogan was its first director, indicating that Kogan's ideas were viewed favorably at that time.[1] Ryzl further reports that the BioInformation Section seemed to flourish under Kogan. It organized meetings, seminars, and discussions; he embarked upon a publicity campaign in newspapers and magazines and was concerned with the use of parapsychology as a military weapon. Kogan also headed the section as it undertook some successful experiments involving transmission of images over short ranges.

Kogan seems to have been at his peak when he visited the United States in 1969 and gave a presentation at U.C.L.A. on the application of information theory to the problem of telepathy.[2] That paper summarized his work and represents the most advanced work on this topic by anyone. Then publication of his work inexplicably stopped. Judging from the papers reviewed, no one else in the U.S.S.R. has reported this line of endeavor.

Although this work may have been completely stopped, it hardly seems likely. Considering that Kogan had successfully started to apply these new concepts to parapsychology and had obtained some new information, it is more plausible that this work did not abruptly stop, but is continuing secretly. Ryzl indirectly lends credance to this idea by discussing the military work done at Kogan's Institute.[1]

It is significant that the Soviets pursued the application of nonstationary analysis to parapsychology, especially in the study of EEG signals. Sergeyev has been the leader in this effort; he has used both correlation functions and spectral analysis.[3,4] Under the more common assumption of stationarity, these statistical quantities are independent of time. Since parapsychological events are quite intermittent and occur rather randomly, their statistical functions, such as correlation, spectra, etc., may vary dramatically in time.

Sergeyev thus defines a nonstationary auto-correlation function as:

$$R(t,\tau) = \frac{1}{T}\int_{t}^{t+T} [X(S) - \bar{X}(S)][X(S+\tau) - \bar{X}(S+\tau)]\, dS \quad (1)$$

where X is the stochastic variable, $\bar{X}$ is the average value of X (presumably over time T), τ is a time delay, and T is the averaging time. He does not specify the averaging time T, but T must be of the same order of magnitude as the time scale of the event being studied.

Since $R(t,\tau)$ is a function of the time delay τ, Sergeyev suggests characterizing this correlation function by several time scales, which he defines as:

$$\tau^{(n)}(t) = \int_{0}^{T} [R(t,\tau)]^{n}\, d\tau. \quad (2)$$

Thus, $\tau^{(n)}$ are random functions of time and Sergeyev claims that $\tau^{(1)}/\tau^{(2)}$ is a measure of the nonlinear modulation by the stimuli received through extrasensory channels. He does not justify nor substantiate this conclusion.

Sergeyev has applied this type of analysis in at least two different modes. First, he compares the ratio $\tau^{(1)}/\tau^{(2)}$ from a "bioplasmagram" to that obtained from signals external to the body, such as the fluctuations in the earth's magnetic field.[4] He claims to have obtained a well-defined relation between these two signals; however, the data shown in his paper do not support the statement that is given in the text. In spite of this discrepancy, Sergeyev's ideas are sound, and in view of the intermittent nature of parapsychological phenomena, it seems reasonable to explore nonstationary analysis of the recorded data. Ryzl (1968) claims that Sergeyev can detect an incoming telepathic stimulus by analyzing EEG records.

Secondly, Sergeyev has applied these ideas in studying changes in the "bioplasmagram" during emotional stress.[3] He used digital analysis and retained the high-frequency content (i.e., up to 30 kHz) of the EEG. It is obvious after studying the data in his previous paper that he also retained the high-frequency content there as well.[4] Although it is not obvious what type of information is obtained in these higher frequencies, Sergeyev does believe that they are important in the dynamic functioning of the brain; it is conceivable that frequencies higher than the normal beta wave frequency may be present and would be instructive to study.

Also, if a very low frequency (VLF) carrier wave is important in the parapsychological communication channel, a study of these frequencies would be beneficial.

It is purely speculative to guess what type of work the Russians are now doing in this area. Obviously, they have a great interest in parapsychology. Mutshall says that they have opened seven new laboratories to study these phenomena since 1960.[5] Kogan had just started to apply information theory to these problems and seems to have developed this technique to the point of usefulness before publication of his work ceased. Although information theory cannot explain the physical mechanism of the NBIT communication channel, it is a very useful tool to analyze the data quantitatively. Kogan had already used this to yield new information (e.g., the information rate dropped as distance traversed increased). More advances from this avenue of approach can be expected, such as (1) qualifying the information to be transferred, (2) designing experiments more amenable to analysis, and (3) studying coding and encoding techniques.

Sergeyev's published work suggests that he is possibly continuing his study of nonstationary analysis of NBIT phenomena. In particular, it seems strange that he did not publish or even mention the use of his techniques for cross-correlations or cross-spectra. Since he almost always was comparing two different signals (EEG and the earth's magnetic field), a nonstationary analysis of the cross-correlation between these signals seems more appropriate than the single channel analysis he published.

It also could be expected that Sergeyev has pursued nonlinear analysis and modeling of NBIT events. He reported that he found a modulation of the EEG at a frequency f_1-f_2 when lights were flashing at frequencies f_1 and f_2.[4] If only linear mechanisms were involved, there would be no energy or modulation of the spectra at a frequency of f_1-f_2, thus suggesting that nonlinear mechanisms may be responsible for this behavior. This

phenomenon should be verified and explained, if possible.

The Soviets should have a vested interest in remote viewing, which interestingly is never mentioned in the available literature. Based upon the experience of Puthoff and Targ, it is not too difficult to set up an experiment in this area, and it seems reasonable to assume that the Russians have probably successfully done so.[6] The next step is obviously to improve the efficiency of the transmission process. Here, the ideas from information and communication theory become important tools because they can be used to determine the amount of information transferred, and thus represent a quantitative measure of success or failure. This tool can then be used to measure the effect of different variables such as distance (which Kogan has already done), directivity, shielding, and the type of information transferred. Mutshall says Kogan has studied this also. It is more reasonable to assume that this work has continued than that is was terminated at this level of development.

ELECTROSTATICS OF TELEKINESIS

According to the published reports, there are several investigations of telekinesis (i.e., moving material objects without touching them) that have occurred at various times and places in Communist Bloc countries. In work done in Leningrad by Vasil'yev and his associates, Mrs. Nina Kulagina (also called Nelja Mihailova) exhibited remarkable psychokinetic ability. Benson Herbert, Milan Ryzl, Zdenek Rejdak, and Viktor Adamenko, among others, have discussed or commented on Mrs. Kulagina's feats. In Moscow, Adamenko worked with another subject, Alla Vinogradova, who is more skilled in telekinesis than Nina Kulagina. Benson Herbert and others also have reported some of the work of Julius Krmessky of Bratislava, who moves hanging mobiles. As telekinetic subjects, the women seem to be superior to the men; Vinogradova and Kulagina are said to be able to move objects weighing as much as 100 gm on a table top.

Viktor Adamenko has advanced an explanation for observed phenomena of telekinesis that is more interesting psychologically than physically. In the articles "Some Problems of Biological Electrodynamics and Psychoenergetics,"[7, 8] he theorizes that the physical force causing the objects to move is due to static electric charges on the objects and electrical fields generated by the subject. It can be shown (as discussed subsequently) that electrostatic forces can indeed be strong enough to produce some of the effects reported. Anyone living in dry climates is quite familiar with electrostatic forces: static electricity discharges from the finger when one walks across the room to the light switch, and articles of clothing stick together and crackle with corona discharge when removed from the gas clothes drier.

Dr. Adamenko's descriptions of the observed phenomena are easier to deal with than his theoretical expositions. An example is his article in The A.R.E. Journal, Vol. VIII, No. 2, pp. 76 to 77, March 1973, cited on page 4 of the Annotated Bibliography of Selective Psychoenergetic Activities, July 1973. In the work with Ms. Vinogradova and others in Moscow, Adamenko used a dielectric cube, 50 cm on an edge, as a table. Various small objects were placed on the upper surface of the cube. Ms. Vinogradova was able to induce an electric charge on the cube, after which she could then move small objects on its surface. With biofeedback training, other subjects were able to duplicate Vinogradova's feats. There must have been some effect that reduced the coefficient of friction between the moved object and the cube, since Adamenko writes at some length about the reduced friction and theorizes that the electric field of the cube polarizes the air molecules and reduces their number of degrees of freedom from six to two. In addition, Adamenko states that the field is inhomogenous and produces a net flow of the air molecules, which tends to buoy up the objects on the cube. Elsewhere he states that the electric field is as great as 10,000 v/cm. This value is approximately the maximum electric field that can exist in dry air because of corona discharge and ionization of the air molecules at higher field strengths. The explanation of air molecules providing the buoyant force to overcome sliding friction is necessary because electrostatic forces alone could not, in the situation described by Adamenko, levitate objects weighing more than a gram or so, and because the coefficient of sliding friction is in the range 0.1 to 0.3 for nonlubricated surfaces.

The concept of a conductor at ground potential near a charged dielectric surface as the mechanism for generating an electric field whose direction and magnitude can be altered is illustrated in simplified form in the Figures 1 and 2. In Figure 1, a plane conducting surface is placed parallel to the dielectric. The resulting electric field is uniform and normal to the two parallel surfaces. If the extent of each surface is much larger than the distance between them, the field is not changed by moving the plates closer together or farther

apart. In Figure 2, the plates are not parallel. In this case, the electric field is nonuniform and has a component parallel to the dielectric slab.

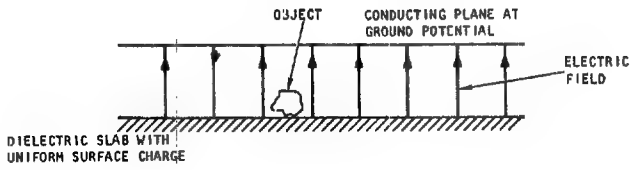

Figure 1. Electric Field Between Parallel Plates

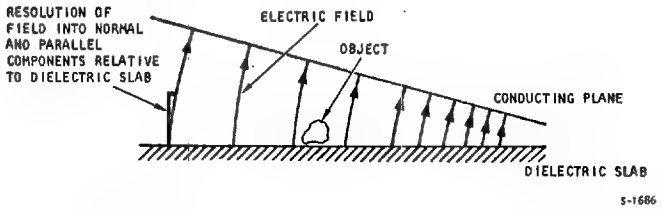

Figure 2. Electric Field Between Nonparallel Plates

In the case illustrated in Figure 1, the object experiences no force parallel to the surface of the slab. In the case shown in Figure 2, the electric field is not normal to the slab. Hence, if the object has an electrostatic charge, it will experience a force that tends to move it parallel to the plate, either toward or away from the region of closest approach between the dielectric slab and the conducting plate. It will experience a force in the same direction, but weaker if the effect is due to polarization of the object rather than an unbalanced charge.

The human body is a conductor. According to Adamenko, the conductivity can be varied at will to affect the field. He does not try to explain in detail the physiological mechanism involved. Even with constant conductivity, the human subject can vary the field near the dielectric surface by positioning his (her) body, arms, hands, etc.

There are two possible mechanisms whereby a small object on the dielectric surface can be moved by the electric field--particularly a nonuniform field. The first mechanism is that the small object is itself electrostatically charged. The second is that it is electrically neutral but can be polarized. An electric dipole in a nonuniform electric field experiences a force in the direction of the field.

The work reported by Viktor Adamenko on telekinesis appears to be genuine information. The experimental arrangement he describes can be analyzed on the basis of electrostatic theory, with predicted results in substantial agreement with the results reported. Adamenko's theoretical explanation appears to be a mish-mash of classical electrostatics and parapsychology. It appears probable that Adamenko himself is a believer in the psi field because he tries to incorporate it into his theoretical framework.

In terms of application to the transmission of intelligence, the telekinetic work of Adamenko does not seem to lead anywhere. However, it does point up the ability of certain individuals to develop an ability to influence the ambient electrical field, apparently by volitional control over physical and physiological processes (e.g., electrical conductivity of the skin). In addition, we must not overlook the possibility that the psychophysiology of this phenomenon may have relevance to transducer mechanisms.

REMOTE PHYSIOLOGICAL SENSORS

A remote sensor is an instrument for measuring a physiological response of the human body without the use of electrodes or other means of contacting the body. In the literature reviewed, there are references to one or more remote sensors developed by Dr. Gennadij Aleksandrovic Sergeyev.* It is claimed that one of these instruments will measure the electroencephalogram of a person at a distance of 5 m. The instrument is classified and no credible description of it is available--only allusion to its existence. One must keep in mind that there is reason to doubt the Russian claim. If the instrument is to register the EEG, it must remotely sense the electromagnetic field associated with the EEG potentials. These potentials are typically of the order of tens of microvolts. American investigators have measured EEG signals with electrodes placed a few centimeters from the head. These electrodes sensed the electric field generated by the brain. David Cohen has measured the magnetic field associated with the EEG by means of a search coil several centimeters from the head.[9] At larger distances from the head, the electric and magnetic EEG fields become drowned in noise. The following discussion is a speculative attempt to guess the operating principles of the instrument.

It is possible that a sensitive electric or magnetic sensor, or some combination of the two, would detect electrical signals from a human body at a distance of 5 m. Although it is unlikely that the output of

*Sergeyev also referenced as Sergeev in the literature.

such an instrument would be a direct measure of the EEG, it would provide information of interest to a police interrogator, such as the strength and rate of the heart beat, the tensing and relaxation of muscles, the depth and rate of breathing, and perhaps the electrical properties of the skin. The uses to which the instrument would be put are reasons enough for official secrecy about its operating principles. Moreover, the story that a remote sensor is a remote EEG sensor would be a natural way of trying to hide the real purpose of Dr. Sergeyev's invention. Some support to the speculation that the invention is a remote lie detector is provided by the statement by Ostrander and Schroeder[10] that Sergeyev is a mathematician at the Uktomskij Laboratory run by the Soviet military.

In reviewing the available literature, five references have been found that may help shed some light on the Sergeyev invention(s). First, Ostrander and Schroeder[11] report Sergeyev's assertion that Nina Kulagina, who reportedly exhibits remarkable telekinetic ability, generates a pulsating magnetic field whose amplitude is not much weaker than the magnetic field of the earth, according to measurements made with his remote sensor. Second, the reporter Anatolij Kongro discusses work by Sergeyev and his students in measuring emotional states of a subject by a remote sensor.[12] No description of the instrument is given in the article. In another reference, there is a description of a remote sensor. The sensor consists of a metal disc suspended in a vessel of water. The disc is coated with a semiconductor and appears to be electrically connected to an EEG recorder. The patient is connected to the other (ground) input of the recorder.

The fourth article contains the intriguing statement that the sensitivity of the bioplasmagram detectors is increased by placing them in water. A doubling of the output is claimed. Although it is claimed that these detectors respond to electromagnetic radiation, this reviewer is unfamiliar with any simple detector whose sensitivity would be enhanced by immersing it in water, except possibly a proton resonance detector for the magnetic field. A small acoustic detector (such as a hydrophone) consisting of a piezoelectric or magnetostrictive material with appropriate electrical connections might exhibit greater sensitivities to sound when immersed in water. The greater sensitivity would be achieved because of the improved match of acoustic impedances between water and detector as compared with the poor match between air and detector. In addition, the physical size and shape of the water container might provide a larger sensitive area for detecting sound than the detector alone.

A speculative conclusion from the previously cited literature, together with the known fact that Sergeyev is a mathematician who has published articles on the application of information theory to parapsychology (see, for example, Reference 15) is that the Sergeyev remote sensor does exist and is an instrument for measuring electric and magnetic fields generated by a human subject at a distance of a few meters. Because of background noise, sophisticated analysis of the signal generated by the instrument is required to extract useful information. The instrument is probably a research tool and apparently has been used with some success on subjects that generate strong electric or magnetic fields (e.g., Nina Kulagina). The coated disc in a vessel of water is probably mostly a Russian fairy tale if we discount the possibility of an acoustic sensor; however, the mention of water suggests that possibly magnetic fields are detected with a proton resonance magnetometer. Certainly water would be a poor medium for detecting electric fields because of its high dielectric constant. The instrument probably comprises several sets of electric and magnetic field detectors arranged such that the noise due to extraneous fields can be reduced by signal extraction techniques.

In the fifth article, a set of noncontacting electrodes used to measure changes in the dielectric properties of the patient is described.[16] It may well be that this instrument is completely different from the Sergeyev remote sensor. On the other hand, these noncontacting electrodes may, in fact, be the Sergeyev sensor and the other published information may be a complete fabrication.

If it is assumed that the described sensor is different from the Sergeyev remote sensor, it can be concluded that the instrument comprises noncontacting electrodes arranged electrically to sense small changes in the dielectric constant of the human body. The electrodes are silver, probably formed by depositing silver on plates of barium titanate. They are built into a rubber covering that insulates them electrically from the body and holds them in a fixed geometric configuration with respect to a portion of the body. The two terminals of a high-voltage supply (e.g., a battery) are connected to the two silver electrodes, with a large resistance in series with one electrode. A change in the dielectric constant

of the body causes a change in the capacitance between the electrodes. The resulting flow of charge either to or from the electrodes produces a measurable potential difference across the resistance. This potential difference is amplified and constitutes the output of the instrument.

The resistance or other details of the signal conditioning and amplifying system are not explicitly mentioned in the article. Instead, the theory of the instrument based on the bioplasma hypothesis is described, as is the notion that there are maser effects in living organisms which lead to the emission of free electrons and protons, and thereby to changes in the electrical properties of the surrounding air. An analysis also is presented to show that the observed signal is not due merely to the piezoelectric effect in barium titanate.

The fact that barium titanate is used to support the silver electrodes is irrelevant to the operation of the sensor, but relevant to the evaluation of the paucity of the report. It is likely that silver-plated barium titanate slabs happened to be available to the investigators. Because of its piezoelectric properties, barium titanate has a variety of uses in military weapons and instruments, such as hydrophones for underwater sound detection and shock-actuated detonators for explosive devices. As previously noted, Sergeyev works in a military research and development laboratory where barium titanate would be available. It has been previously reported that much of the Russian parapsychological work to which we have access is done as an avocation by the investigators without official support or sanction. In such circumstances, the use of silver-plated barium titanate as an inexpensive and available substitute for solid silver electrodes is understandable.

Other types of remote sensors mentioned in the available literature seem quite simple and conventional. For example, V. Puskin (Pushkin) wrote about a sensor used to demonstrate that the power shown by Alla Vinogradova to move objects without touching them was due to the electrostatic charges induced on the objects.[17] The sensor in this case was a simple neon glow lamp. When the object was discharged by means of the neon lamp, it could no longer be moved.

A broader question regarding remote sensors is to determine or predict types of sensors that logically would have been or would be developed in the course of following the indicated lines of investigation. Perhaps the Russians have, in fact, developed such instruments; perhaps they are going to do so. Perhaps they have tried and have not been successful. Possible sensor developments discussed in the following paragraphs are not meant to be exhaustive; rather, they are speculative and offered as examples of what may or might be.

A tunable antenna for detecting low-frequency, very-low-frequency, or extremely low-frequency electromagnetic radiation could be used. The Russians believe both in mental telepathy and in a prosaic physical mechanism for it. The most probable mechanism is electromagnetic radiation. A tunable antenna could be used in two types of experiment: trying to detect the radiation from the telepathic agent and trying to generate radiation of the right frequency to interfere with telepathic reception.

A neutrino detector may be used. Both the Russians Je. Parnov[18] and the American Martin Ruderfer[19] have suggested neutrinos as the means of transmitting thought from one mind to another. One of the collaborators in the present study, J. Eerkens, has a plausible hypothesis about the production and detection of neutrinos that could be experimentally tested by relatively modest expenditures for equipment and labor.

A magnetic field or field gradient detector could be used. The Russians and other Eastern Europeans are greatly interested in dowsing, or finding ground water. A currently popular theory of dowsing is that the human body is sensitive to small changes (temporal or spatial) in the magnetic field of the earth, such as might be produced by water near the surface of the ground. If the human body can generate as well as sense magnetic fields, such human magnetism might be the basis of some form of thought transference or psychokinesis. It is reported that Nina Kulagina warms up her psychokinetic powers by causing a compass needle to move; as previously mentioned, Dr. Sergeyev claims that Kulagina generates a pulsating magnetic field not much weaker than the magnetic field of the earth according to measurements made with his remote sensor.

A noncontacting temperature detector may be used. V. Adamenko and others have shown interest in the properties of human skin in three separate lines of investigation. First, Adamenko ascribes some electrostatic properties to the skin to support his theories about telekinesis. Second, he has developed a tobioscope for investigating the electrical properties of the acupuncture points on the skin. Third, he has written joint articles with the Kirlians about photographing the skin with the Kirlian apparatus.

It seems natural that eventually he or other workers in Russia will be curious about other properties of skin, such as temperature. Two American investigators, Barrett and Myers, have recently reported a technique of subcutaneous temperature measurement by measuring microwave radiation from the skin[20]. One might expect the Russians to develop remote temperature monitors, either on their own or by copying the American techniques. Such a monitor would be a useful adjunct to a remote lie detector, and its development would probably be supported by the Military or the Secret Police.

In addition to work on the development or application of remote sensors, one can expect the Russians to try to develop data processing equipment to handle the signals from an assembly of several sensors. In their published work, the Russians have shown interest in various types of correlation analysis. For example, G. A. Sergeyev has published a paper dealing with nonstationary random functions and their application to parapsychological phenomena[21]. It would be natural for Dr. Sergeyev (or others) to attempt to mechanize his methods of statistical analysis by a special-purpose electronic signal processor. The difficulty may be that the Russians are not very advanced in electronics and would hesitate to develop such a piece of equipment. Nevertheless, it would seeem to be a logical next step.

SENSITIVITY OF HUMAN SUBJECTS TO MAGNETIC FIELDS

An interesting facet of this study is the fascination of Russian and Czechoslovakian parapsychologists with the effects of magnetic fields on human beings, as well as the presumed ability of human subjects to generate magnetic fields. Presman presents a survey of the effects of weak magnetic and electric fields on living organisms, such as the ability of birds to use the earth's magnetic field as a cue in navigation[22]. There is, in fact, a respectable body of experimental evidence in reports published both in Iron-Curtain countries and in the West on the effects of magnetic fields on the growth of plants, the orientation of simple animals, and the like. Presman is mainly interested in the possibility that electric and magnetic fields can be used by complex animals for information transfer. He theorizes that humans have largely lost this ability through evolutionary disuse following the development of speech, a much more efficient method of communication. Those few individuals who have the ability to communicate by electromagnetic signaling are, in Presman's view, evolutionary throwbacks.

There is some evidence that human subjects can detect small changes in a magnetic field. Harvalik reports that about 80 percent of subjects tested were sensitive to magnetic field changes in tests where the field was generated by an ac or dc current passing through damp ground[23]. Harvalik, a Czech-American, proposes that dowsers are able to sense changes in the earth's magnetic field due to moisture in the ground. The sensing organs are the muscles of the forearms. The dowsing rod is an amplifying and indicating device for the slight twitching of the muscles responding to the changes in magnetic field strength. Native Czech writers also are fascinated with dowsing, as evidenced by reports by the following authors cited in the Annotated Bibliography prepared by Skaidrite Maliks Fallah[24]: Boleslav and Boleslav, p. 13; Brada, p. 14; Drbal and Rejdak, p. 19; and Kaderavek, p. 36. It appears that the paper presents actual experimental data. Actual data on the sensitivity of humans to weak magnetic fields are scarce, a situation that should be remedied by research.

A related question to magnetic field sensitivity is the ability of a human subject to generate a detectable magnetic field. Adamenko alleges that a Russian psychic (Nina Kulagina) generates a pulsating magnetic field when she is demonstrating telekinesis. Belief in the existence of such an ability is speculative at present. However, the concept of volitional human generation of a magnetic field is consistent with present knowledge of physics and biology.

BIOPHYSICAL INFORMATION CARRIER MECHANISMS

In several papers, I. M. Kogan reports experiments and hypotheses concerning telepathic information, and describes information theory aspects of the observed phenomenon; he developed rationale for transmission mechanisms. Essentially, his thesis is that the energy required is about 10^{-8} to 10^{-20} joules. He hypothesizes that the transfer of information is advanced by ultra-long electromagnetic waves in the spherical waveguides formed by the surface of the earth and the ionosphere. In our opinion, the work of I. M. Kogan is creditable and the best thought out of any of the work reviewed.

Observing that experienced physicists such as Kogan took serious notice of parapsychology from 1966 to 1969 and that almost nothing profound has appeared on the subject in the Soviet literature in the last 5 yr suggested that further theoretical and experimental developments along the lines outlined by Kogan are continuing underground in the Soviet Union. Kogan posed too many interesting

and challenging questions for himself and his colleagues not to have delved into them further. Based on the well-known predilection of Soviet physicists to solve difficult and challenging problems and their excellent training in modern physics, the possibility that a team of Soviet physicists is at work to systematically uncover and learn the physical mechanisms of parapsychological events is highly probable. Had Kogan not presented such a clear and sound proposal 6 yr ago, one might have wondered if Soviet physicists have any interest at all in novel biophysical information transfer (NBIT) mechanisms. Clearly, if one could find out where Kogan is working and what he is doing, this question would be answered.

Assuming that the U.S.S.R. started a special NBIT program some time in 1970, by now they should have developed some sensitive instruments to detect, monitor, and analyze VLF and ELF radiations for possible information content, as Kogan suggested should be done. Also, they must have been instrumental in developing sensors to monitor fluctuations in the human body's electric and magnetic fields, and they may have a team of scientists studying the properties of bio-organic molecules and their response to electromagnetic ELF/VLF radiation. The Russians may now be implementing the next logical step, namely to reinforce, enhance, or aid NBIT in certain trained or gifted individuals after having discovered the basic communication carriers.

If experiments which generate special ELF/VLF waves are being conducted, it may be possible to intercept and analyze them because they will travel across the world. However, as discussed subsequently, these manipulated VLF and ELF frequencies may be very monochromatic and undetectable by the usual relatively broad-band radio frequency detectors. For example, it would be like finding the red emission line of the 1-mw Helium-Neon laser emitted from a satellite to the earth and observed against a background full of bright direct sunlight. With the proper narrow-band filter, such a line can be observed, of course, but the frequency must be known.

It is rational to assume that the Soviets pursued the investigation of various physical methods that might serve as novel biophysical information transmission mechanisms. Whether or not ELV/VLF mechanisms explain parapsychological events may be a moot question if these mechanisms can be utilized for human information transfer. A review of possible NBIT transmission mechanisms that are compatible with current modern physics yields three schemes.

(1) Very-low frequency (VLF) and extremely low frequency (ELF) electromagnetic waves

(2) Neutrinos, based on the photon theory of neutrinos

(3) Quantum-mechanical (ψ) waves, based on the schizo-physical interpretation of basic QM theory

Presently, most U.S. and Soviet experiments on psychic phenomena and the use of the law of parsimony would point to ELF/VLF mechanisms, but the other two possibilities cannot be ruled out.

MISCELLANEOUS OBSERVATIONS

The bulk of the Soviet papers on parapsychological events and novel biophysical information transfer (NBIT) demonstrate not only a poor understanding of physics, but also generally fail to deal with psychological and physiological processes that may underly NBIT. No interdisciplinary approach that would help alleviate these difficulties is described in the literature reviewed. For example, Sergeyev measures the bioplasmagram (presumably, electrical or electro-static field) associated with heart action and the bioplasmagram associated with breathing. He states that under certain conditions the heart action and breathing can interfere with one another, apparently by inductive interference. Our guess is that he may not know exactly what he is measuring and probably does not understand the interaction of breathing rate and heart rate. From his background in signal analysis, he does know how to analyze the bioplasmagram.

Performance Training and Volitional Control

In the more creditable parameters reviewed in this study, the Soviets indicate an interest in volitional control of the phenomena observed. For example, Adamenko indicates that subjects are trained by hypnosis or using biofeedback procedures to control the conductance between acupuncture points in the skin. In another case, he refers to the use of self-induction, self-suggestion, and bioelectric induction to achieve the electromagnetic changes associated with psychic phenomena.

His model for training in telekinesis is volition effort that leads to changes in skin conductivity that are simultaneous with telekinsis. During training, the subjects learn by volitional effort to charge a battery of condensors; the charge is roughly proportional to volitional effort. Once trained, the subjects can use a similar volitional effort to electrostatically charge an object at a distance. In describing what may be a current

Soviet position in training, Adamenko further states in his discussion on "..Electrodynamics and Psychoenergetics", "..Production of special states of consciousness and psychic training at the level of psychoenergetics using modern devices has just as great significance as the investigation of the psychic field of physically talented individuals."

Another method of training in the literature reviewed on telepathy is described by Milan Ryzl. Ryzl claims that approximately 10 percent of the 500 subjects he trained demonstrated some ability as a consequence of the training. The six principal stages of Ryzl training procedure are outlined below:

(1) Orient subject and improve his motivation.

(2) Training in hypnosis--increase confidence of the subject, increase suggestability.

(3) Attempts to induce visual hallucination. Close off subjects to incoming stimuli other than hypnotists words. Perfect mastery and consistency of visual hallucination. Inhibit spontaneous mental processes.

(4) Induction of extraordinary perception. Simple assignments (simple discriminations). Suggestion is to be able to see, with eyes closed, objects in front of him; objects may be described in detail to facilitate hallucination.

(5) Training, including elaboration of procedures, removal of errors, training in use of skills, and development of sense to discriminate between correct and erroneous psychics.

(6) Auto-induction of the essential state of mind; on the razors edge between sleep and wakefulness.

Ryzl goes to great lengths to prevent the occurrence of errors that are perceived by the subject as a mistake that has been made. For example, when the subject reads a license plate of a car, "if the subject reads OE-6333 instead of CF-6888, we interpret the result as successful and strengthen the subjects compliance."

The training then may be characterized as "shaped" reinforcement learning utilizing hypnosis and the development of a special state of consciousness. The training is extremely extensive and time consuming (3-hr sessions, 3 times a week, over a period of months). If nothing else, the training can be conceived to be an elaborate screening process during which subjects with insufficient talent and motivation are weeded out.

Ryzl's "essential state of mind" appears to be a semi-hypnogogic state usually accompanying low-frequency α and high-frequency θ brain rhythms of 7 to 5 Hz. Such a subject state could be more quickly developed utilizing biofeedback techniques.

In view of the high-reward-frequency/no-failures-allowed aspects of the training procedure, it is surprising that Ryzl only claims that 10 percent of his subject population demonstrates psychic ability as a consequence of the training. Due to the dual Russian interest in both hypnosis and NBIT, the Soviets have probably done a thorough evaluation of Ryzl's procedure.

Hypnotizing Machines

The Russian interest in hypnosis has lead to many attempts at automating hypnosis. Typical techniques are tape recordings, rotating discs in the visual field, and application of pulsating electrical current through the head. The latest Soviet attempt in this area is "LIDA" (apparently an acronym for remote control therapeutic apparatus); a U.S. patent (No. 3,773,049, Nov. 1973) by Rachichev et. al. has been issued for apparently the same device.

This device, described by B. Belenkig, 1973[25]; V. Rabichev, et. al., 1973[26]; and Bragen and Petrov, 1974[27]; is essentially different embodiments of an apparatus that subjects a patient to pulsating light, heat, sound, or very-high-frequency, electromagnetic radiation (VHF EMR), simultaneous or individually. The pulse repetition rates (PRR) are programmable. It is uncertain to the reviewer whether the pulse repetition rates suggested in the patent, 10 to 100 Hz, can be achieved for thermal sensations. At the correct PRR, the device may be effective at least in neuropsychiatric disorders.

Nowlis has demonstrated that certain EEG biofeedback devices with PRR-like visual feedback causes alpha entrainment and enhancement, while Fehmi has demonstrated the same for auditory EEG biofeedback. EEG entrainment caused by strobe light sources is, of course, a well-known phenomenon. The range of PRR of the apparatus is 10 to 100 Hz. Apparently the inputs made to the subject in each sensory modality are synchronous and directed to the recipients head or face. The subjective consequences of the apparatus are difficult to imagine, especially for VHF EMR and thermal stimulation. The selection of appropriate stimulus intensities and

PRR are not described. However, apparently the training of the subjects involves gradually lowering the PRR.

The Soviets claim numerous therapeutic advantages of the LIDA apparatus as a consequence of "inducing the desired biorhythm". The "desired biorhythm" is unfortunately not described in the literature available to us.

An alternative use of LIDA may be in changing the subjective psychological state of the subjects. For example, it is well known to biofeedback therapists in this country that EEG biofeedback promotes feelings of well being, openness, and transference to the therapist. One model for the use of LIDA to achieve these effects without monitoring the patient would be to gradually reduce the pulse repetition rates from 15 to 6 Hz over the course of 1 hr, thus entraining the individual's α at some frequency and shaping it to some lower frequency. The Soviets claim that the effectiveness of LIDA improves with use (i.e., training) of the subject. Being familiar with the subjective effects of biofeedback, it is still difficult to imagine the subjective consequence of pulsed VHF EMR either separately or in synchronous combination with the other modulation.

In summary, the device is considered veridical with probable unique subjective consequences. At lower PRR's, the subjective experiences may correlate to those of EEG biofeedback.

The R.F. Electromagnetic Radiation Hypothesis

L.L. Vasilyev describes Soviet attempts starting in the 1930's to replicate the work of F. Cazamalli, an Italian researcher of the 1920 to 1930 period.[28] Cazamalli essentially assumed that the human brain produced EMR in the radio-frequency spectrum and claimed to have measured the same. Vasilyev claims that the Soviets conducted a systematic attempt to replicate Cazamalli's work to no avail. In the rest of the article (approximately 170 pages), he puts down the R.F. EMR hypothesis (see, for example, pp. 110 and 160 to 171). In reviewing Cazamalli's book El Cervanto Radiante, not much was achieved in the way of enlightenment if the report is accepted from Cazamalli's perspective. His idea was essentially that people doing parapsychological tricks would produce novel and systematic RF EMR. If this hypothesis is ignored and the consequences of the behavior of his subjects are examined, there is some indication that he might have been actually getting something of which he was not aware. For example, he indicates surprise that he received signals of greater amplitude when his subjects didn't try. He also indicates that when there were 3 to 4 people in the shielded room with the subject, there were no signals detected. Another observation that he frequently made was that physical activity of the subjects reduced or eliminated the signals. Furthermore, he reports that when "emoactive" tension is discharged through motor, vascular, and glandular expression (passionate reactions, flushing of the face, cries, wails), the phenomenon of radiation stops abruptly."

Based on Cazamalli's behavioral description of his subject, there may have been a negative correlation between the level of cortical arousal of his subject and the occurrence of whatever he was measuring with his primitive RF antenna and receivers. If this is indeed the case, his primitive apparatus may have, in some way, detected the higher cortical voltage of his resting subjects or changes in their electromyographic levels. Consequently, Vasilyev's effort to discredit Cazamalli could possibly be disinformation, although such a position would be difficult to defend.

Psychotronics

At this writing, the only available source of information about psychotronics is the Annotated Bibliography (AB)[24]. The introduction to the Annotated Bibliography states merely that the terms psychotronics, psychoenergetics, and parapsychology are used to denote the same field of investigation by the Czechs, the Russians, and the Anglo-Saxons, respectively. It is reported that in Czechoslovakia, psychotronics is an officially recognized branch of science. There is a conflict between the emphasis suggested by the word itself and the brief descriptions presented in AB.

The term itself suggests a blend of the concepts embraced by psychology and electronics. In many portmanteau words of this type, the suffix -tronics suggests electrical or electronic instrumentation techniques applied to experimental investigations in the field. One might conclude from the form of the word alone that the field of psychotronics is visualized as comprising elements of psychology combined with sophisticated instrumentation techniques to discover new and useful properties of the human mind and central nervous system.

The AB presents a somewhat different view. The introduction, as noted above, states that psychotronics is the Czech word for parapsychology. An abstract on page 66 states that psychotronics embraces telepathy, telegnosis, rhabdomancy, psychokinesis, cosmic biology, and biological radiation.

Perhaps there is some truth in both views. The Czechs have published serious papers on dowsing, or finding water by means of a divining rod. For example, Branda (AF, p. 14) presented a paper in Prague in 1973 relating dowsing to electromagnetism, myotransfer, electromyography, and the effect and influence of the seasons on these paranormal phenomena. Drbal and Rejdak (AB, p. 19) have written a paper on "divining, dowsing, and readiesthesia."

Perhaps the most informative abstract on the theory of dowsing is that of Z. V. Harvalik, a Czech-American. Dr. Harvalik points out that the human body can respond to minute changes in magnetic field. It is suggested that ground water distorts the local terrestrial magnetic field and that successful dowsers exploit this effect. The dowsing rod, held loosely in the hands, is merely a mechanical amplifier of a slight reaction of the forearm muscles to the changing magnetic field. (AB, pp. 25 to 26.) Mirko Kaderavek (AB, p. 36) also has a paper on dowsing rod reactions.

There appears to be a bias in the AB toward the occult and paranormal view of psychotronics and away from the physical and instrumental view. Short shrift is given in the abstracts to papers that describe reasonably good experiments. The work reported by Harvalik occupies about a third of a page. The paper of Kaderavek rates only a few lines. However, a paper by Miloslav Loucka about a model of telepathic communication, which looks like pure fantasy, rates about one and two-thirds pages. The compilers of AB seem to want to believe in the occult, the mysterious, and the unexplainable. Experimental attempts to provide rational explanations for certain phenomena classified as parapsychological receive little space. The paper by Loucka reveals the attitude of many Czech scientists about psychotronics. Loucka postulates the existence of an information field as the carrier of telepathic information. Loucka considers that the same field provides the explanation of telekinesis; this is in contrast to the work of Adamenko and other Russians, who claim that telekinesis is a manifestation of the electrostatic field.

To summarize the field of psychotronics, from the point of view of its practitioners, the following can be postulated:

(1) Mental telepathy, clairvoyance, telekinesis, and telegnosis are real. There is a lack of unambiguous experimental evidence concerning these phenomena; this lack must be remedied.

(2) These phenomena do not conflict with physics and other sciences. In so far as possible, physical explanations will be sought for these phenomena.

(3) Existing theories of physics are not adequate to explain all psychotronic phenomena. Therefore, there must exist some new physical principles to be discovered or elucidated.

In short, the theoretical basis of psychotronics is substantially the same as that advanced for parapsychology in this country.

Bioplasma

The appropriate starting point for this discussion is to try to define or explain what is meant by the term bioplasma. In origin, the concept seems to be analogous to the "aura" of the Western parapsychologists. The Western concept is an old one, dating from the prescientific age ("The Age of Faith") when the soul or spiritual body of a human being was thought to be as real as the physical body. The aura was an emanation or radiation from the spiritual body. Saints in old paintings are depicted with halos or auras. Modern Western psychics still believe in the aura and in the ability of gifted individuals to see it.

However, the Eastern (Bloc) term bioplasma, although used in a confusing fashion, appears to be frequently a generic term for all radiant phenomena associated with a living body (e.g., thermal, electrical, magnetic, electrostatic). Viktor Adamenko has used the bioplasma concept as supported by theoretical and empirical considerations. However, in his later papers, he does not mention bioplasma, but instead writes about the psi field, the biological electric field, and so forth. The strongest theoretical arguments for bioplasma seem to come from G.A. Sergeyev[29]. For Sergeyev, the bioplasmagram is a low-frequency electrostatic field.

The Russians assert correctly that plasma is a fourth state (or phase) of matter. Confusingly, Sergeyev and other Russian parapsychologists aver that living organisms generate a plasma that surrounds them. They get around the physical difficulties of maintaining a plasma at temperature and pressure conditions compatible with life by the hypothesis that living matter obeys physical laws different from those for inanimate matter.

The classical physical objections to the bioplasma concept are summarized below. A plasma is a state of matter similar to a gas

in which a large fraction of the molecules or atoms are ionized. A plasma can exist at high temperatures or at very low densities. At high temperatures, the individual particles have enough kinetic energy that ionization can result from collisions; the plasma is maintained by virtue of the high rate of production of ions, which balances the recombination rate. At low pressures or densities, the rate of ionization need not be high because the recombination rate, which depends on the rate of collision of ions with each other, is low. A physical plasma consists of approximately equal numbers of positive and negative ions. Electrostatic attraction between the bodies of positively and negatively charged matter holds the plasma together, in a sense. The plasma can absorb and lose energy by electromagnetic radiation. A means of detecting the presence or absence of plasma is to look for the characteristic emission or absorption of radiation. If the Russians take the bioplasma concept seriously, they will probably try to detect it by virtue of these radiation characteristics. At temperature and pressure conditions consistent with the maintenance of life, a classical plasma cannot exist.

The Russians must have done significant work in plasma physics as part of their program of developing nuclear weapons. This technology would be applied to a study of bioplasma. For several reasons, such studies probably would have been done secretly. First, the Russians might not wish to reveal their full capabilities in plasma physics. Second, not every Russian scientist is a parapsychologist and would not want to experience the expected ridicule for such a frivolous use of plasma physics terminology. Thus, in the available papers on Soviet parapsychology, the theory of bioplasma remains vague and unclear and at best is an attempt to employ analogous terminology from physics to NBIT.

SPECULATION OF THE NATURE OF SOVIET LABORATORIES INVESTIGATING NBIT

Available published reports are contradictory or inconclusive regarding whether (and to what extent) the Soviet government actively supports investigative or speculative work in the field of NBIT, parapsychology, or psychoenergetics. It appears that some of the older work in the field, before the middle 1960's, was sponsored by the government. More recently, there is conflicting evidence as to whether the field has fallen into official disfavor, with the result that most published work has been done without specific funding or authorization. In Russia, scientific research work is done mostly in institutes. Each institute is presided over by a senior scientist or academician. Apparently in the Russian system, the presiding scientist of an institute has a great deal of freedom and independence from bureaucratic dictation as to the kind of work undertaken. This reviewer has seen nothing about the organization of scientific work conducted by Russian military organizations. One must presume that the organization parallels the civilian institute, with a military officer in charge, assisted by a chief scientist.

Parapsychological investigations in the Soviet Union are probably conducted in two types of circumstance: first, work that is not officially sanctioned or funded by the Russian government; and second, work that is officially supported and is conducted in a military research laboratory or in a laboratory that is an adjunct to another institution.

In the first type of circumstances, the investigators themselves are employed in research institutes to do other types of work. Their work on parapsychology is conducted on the side, perhaps on their own time. Where possible, they employ the facilities of the institutes in which they work. For example, a shielded room used for testing electronic apparatus also may be used for subjects and investigators in mental telepathy experiments. Special test equipment has to be borrowed or bootlegged from other projects in the institute, built on their own time, or purchased with money contributed by the investigators themselves. The results of such work seem to be published in the unclassified literature. Apparently, official government disapproval of such work does not preclude publication of results. As an indication of this condition (as previously mentioned), barium titanate slabs coated with silver may have been used as electrodes because pure silver was not readily available.

In the second type of circumstance, government approval of the work seems to imply the intent to use the results to the advantage of the military or the secret police. The officially sanctioned work, if there is any, seems to be classified. The laboratory itself would be camouflaged. It would probably be part of another organization, such as a military research laboratory or a psychiatric hospital. In any event, the camouflage would be fairly difficult to penetrate, since a parapsychological laboratory would not have unusual requirements for electrical power, material supplies, or test equipment. The staff would probably consist of psychologists, biologists, physicists, electrical engineers, mathematicians, technicians, and some "gifted" subjects.

Much of the work of Vasilyev was conducted with subjects who had psycho-

logical or psychiatric problems. It would thus be logical to locate the secret parapsychological laboratory in a mental hospital. It is reported that the Russians tend to sentence political deviates to mental hospitals rather than prisons. It might be possible to learn from interviewing political deviates and other patients who have been released from Russian mental hospitals.

CONCLUSIONS

From the review of essentially open Soviet literature, the following conclusions are made:

(1) The Soviets have done significant work on signal extraction, statistical, and information theory approaches to novel biophysical information transfer mechanisms.

(2) The Soviets have done creditable work on the electrostatics of telekinesis and have probably now turned their attention to the psychophysiological aspects of the phenomenon.

(3) The Soviets have an interest in remote physiological monitors, have developed one or two new instruments, and are probably involved in R&D in this area.

(4) The Soviets had and probably still have an interest in the physics of NBIT transmission mechanisms and are probably doing research in this area.

(5) There is a developing interest in the Soviet Bloc to apply psychophysiological training methods (similar to biofeedback) to develop control over NBIT mechanisms.

(6) All the Soviet research that has been reviewed suffers from the lack of an interdisciplinary approach.

(7) The Soviets are investigating the psychophysiology of multimodal, programmed stimulation as a method to entrain physiological rhythms and produce changes in states of consciousness.

(8) A systematic, interdisciplinary approach to NBIT by the Soviets would require only a modest commitment of resources. A small number of key personnel with an adequate supporting staff of engineers and technicians could make substantial headway in this area. At this stage, in our opinion no unique technological breakthrough is required--only careful investigation. In addition, no unique features such as physical plant, facilities, services, or equipment would specifically identify an NBIT R&D laboratory from other types of laboratories.

These conclusions are drawn in spite of the fact that most of the published material we have reviewed is confusing, inaccurate, and of little value from a scientific point of view. In this respect, the review team may have erred in the direction of trying to make too much sense from a small data base.

REFERENCES

1. Ryzl, Milan, 1968, "Parapsychology in Communist Countries of Europe," International J. of Parapsychology, Vol. 10, No. 3, p. 263.

2. Kogan, I.M., 1969, "The Information Theory Input of Telepathy," from UCLA symposium entitled "A New Look at ESP".

3. Sergeyev, G.A., "Principles of Spectral Analysis of Bioplasmagrams During Emotional Stress", Kontrol Sostoyaniya Cheloveka-Operator, 1970, p. 18.

4. Sergeyev, G.A., "Some Methodological Problems in Parapsy," Telepatie a Jasnovidnost, 1970, p. 79.

5. Mutshall, Vladimir, "The Present State of Research in Telepathy in the Soviet Union."

6. Targ, Russell, and Harold Puthoff, Information Transmission under Conditions of Sensory Shielding," Nature, 251, 1974.

7. Adamenko, V.G., "Some Problems of Biological Electrodynamics and Psychoenergetics," Nekotoryve Vop Biol Eleki Psikh, Moscow, Russian, pp. 27 to 29.

8. Adamenko, V.G., "Some Problems of Biological Electrodynamics and Psychoenergetics," Certain Problems of Biological Electrodynamics and Psychoenergetics, Moscow, Russian, pp. 22 to 29.

9. Cohen, D., Science, Vol. 161, pp. 784 to 786.

10. Ostrander and Schroeder, Psychic Discoveries Behind the Iron Curtain, Prentice Hall, 1970, p. 20.

11. Ostrander and Schroeder, Psychic Discoveries Behind the Iron Curtain, Prentice Hall, 1970, pp 73 to 74.

12. Kongro, A., "Emotion Detector Experiments," Znaniye Sila, No. 7, Moscow, Russian, 1972, pp. 29 to 36.

13. Sergeyev, G.A., "Detection of Telekinesis by Semi-Conductors," Abstract from Telepatie A Janovidnost, Translated by T. Waskova.

14. Sergeyev, G.A., Shushkov*, G.D., and E.G. Griasnuhin," Bioenergetics Questions (Material of the Scientific Methodological Seminar in Alma-Ata), Dombrovsky, B.A., Sergeyev, G.A., and B.M. Inyushin, editors, Southern California Society of Psychical Research, Inc., 1972, pp. 17-1 to 17-4.

15. Sergeyev, G.A., "Some Methodological Problems of Parapsychology," Telepatie A Jasnovidnost, Prague, 1970, pp. 79 to 87. Also in Translations on Czechoslovakia, GVO No. 772, JPRS L/4922, U.S. Joint Publications Research Service, June 3, 1974, pp. 1 to 13.

16. Sergeyev, G.A., Shushkov, G.D., and E.G. Griasnuhin, "A New Detector for Registering the Physiological Functions of the Organism," Bioenergetics Questions (Material of the Scientific Methodological Seminar in Alma-Ata), Dombrovsky, B.A., Sergeyev, G.A., and B.M. Inyushin, editors, Southern California Society for Psychical Research, Inc., 1972, pp. 18-1 to 18-2.

17. Pushkin, V.N., "Knowledge-Strength, Znanije-Sila, No. 10, 1972, pp. 4 to 49.

18. Parnov, Je., Nauka i Religija, No. 3, 1966, pp. 48 to 49.

19. Ruderfer, Martin, "Neutrino Theory of Extrasensory Perception," Abstracts: 1st International Conference on Psychotronics, Vol. 2, Prague, June 1973, pp. 9 to 13.

20. Barrett and Myers, Science, Vol. 190, Nov. 14, 1975, pp. 669 to 671.

21. Sergeyev, G.A., Telepatie a Jasnovidnost, Prague, Czechoslovakia, 1970, pp. 79 to 87.

22. Presman, A.S., "Electromagnetic Signaling in Animate Nature," Moscow, 1974.

23. Harvalik, Z.V., "A Biophysical Magnetometer-Gradiometer," Virginia Jour. Sci., Vol. 21, No. 2, 1970, pp. 59 to 60.

24. Fullah, S.M., Selective Psychoenergetic Activities--Annotated Bibliography, prepared for Dept. of the Army, Contract DAAK0273-M-4729, MRU, Task No. 106, July 1973.

25. Belenkig, B., "LIDA Apparatus for Biorhythmological Studies," Sovetskaya Moldaviya, Russian, No. 8, December 1973, p. 4.

26. Rabichev, L.Y., et. al., Apparatus for the Treatment of Neuropsychic and Somatic Diseases with Heat, Light, Sound, and VHF Electromagnetic Radiation," U.S. Patent No. 3,773,049, November 20, 1973.

27. Bragin, V., and P. Petrov, "Hypnotizing Machines," Nauka I. Religiya, No. 6, 1974, pp. 34 to 35.

28. Vasil'yev, L.L., Experimental Studies of Mental Suggestion, JPRS 59,163, Joint Publications Research Service, May 1973.

29. Sergeyev, G.A., and V.V. Kulagin, "The Interaction of Bioplasmic Fields of Living Organisms with Light Photon Sources," Bioenergetics Questions (Material of the Scientific Methodological Seminar in Alma-Ata), Dombrovsky, B.A., Sergeyev, G.A., and B.M. Inyushin, editors, Southern California Society for Psychical Research, Inc., 1972, pp. 14-1 to 14-2.

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*Also referenced as Suskov in the literature.

IMPROVING REAL TIME ESP BY SUPPRESSING THE FUTURE: TRANS-TEMPORAL INHIBITION

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SUMMARY

During retrospective analysis of the data of a highly successful experiment on teaching real time ESP ability through the provision of immediate feedback of results, extremely strong, below chance missing of the immediately future target was found, a precognitive ESP effect. This avoidance of the future was highly correlated with the magnitude of the real time ESP used: the more real time ESP hitting, the more the immediate future was avoided. These results are consistent with a theory of another dimension of the mind, the duration of whose "experienced present" includes times which, to ordinary consciousness, are past and future. Tapping into this other mental dimension is not useful for using real time ESP per se, for past and future information constitute noise. Trans-temporal inhibition, a type of edge detection process extending over time, enhances detection of the desired real time ESP information by actively suppressing the ESP derived information about the immediate past and future (postcognition and precognition). Application of this theory allows calculation of the degree to which percipients are strategy-bound, applying maladaptive guessing strategies instead of trying to detect relevant ESP signals. An initial experimental test of one of the implications of the theory, shifting of the areas of inhibition by change of psychological focus, further supports the theory. A relatively universal information sharpening technique thus seems to be employed in using ESP.

One of the major problems that undermines efficient functional study of the nature of extrasensory perception (ESP) is the unreliability, overall low level of manifestation, and prevalence of decline effects when ESP is studied in the laboratory. In the vast majority of experiments, even when ESP is present to a statistically significant degree, the vast majority of responses made by percipients are simply guesses, and only a very tiny fraction of them are ESP: the signal to noise ratio is very poor, making study of the characteristics of the signal difficult. As percipients continue to work at ESP tasks, it is very common for them to decline in performance and eventually be reduced to mere chance guessing.[1,2] Ten years ago[3] I theorized that this was due to lack of immediate feedback to percipients, so they could not learn to distinguish subtle characteristics of mental events that indicated when they were generally using ESP from mere guessing processes. This theory has recently been elaborated.[4]

Two major studies have now been carried out in my laboratory, one already published[5] and the second[6] being prepared for publication, that strongly support the hypotheses that: (1) the provision of immediate feedback to percipients with some ESP talent at the start of training can slow down or eliminate the common decline effect (stabilize performance); (2) can allow some percipients to learn; and (3) the degree of learning (improving performance) in the feedback situation is directly proportional to the ESP level a given percipient initially brings to the training sessions. These developments suggest that efficient functional studies may soon be possible.

In the course of post hoc analysis of the first Training Study, some remarkably strong effects produced by precognition, ESP cognition of immediately future events, were discovered, and confirmed in subsequent analysis of the second Training Study data. These precognitive effects, and their theoretical implications for an information processing mechanism used for enhancing real time ESP, named trans-temporal inhibition, will be the focus of this paper. The data on learning ESP per se are available elsewhere,[5,6] and will not be discussed further here except when they are relevant to the main focus.

OVERVIEW OF THE EXPERIMENTAL PROCEDURE

Figure 1 provides an overview of the general procedure of each of the two studies. Since the learning theory predicted that percipients had to have some demonstrable ESP to begin with for feedback training to have much effect, it was necessary to start with relatively talented percipients. Since percipients who can demonstrate individually significant ESP in a short period of testing were assumed to be relatively rare, a two-stage selection procedure proceeded the actual Training Study. In the first stage, teams of experimenters gave quick ESP card guessing tests to large classes of UC Davis students. Students who showed individually significant ESP hitting were selected from these results.

In screening hundreds of students a certain number were bound to score at least at the .05 level of significance by chance alone, so those selected students who accepted our invitation to participate in the second stage Confirmation Study were given

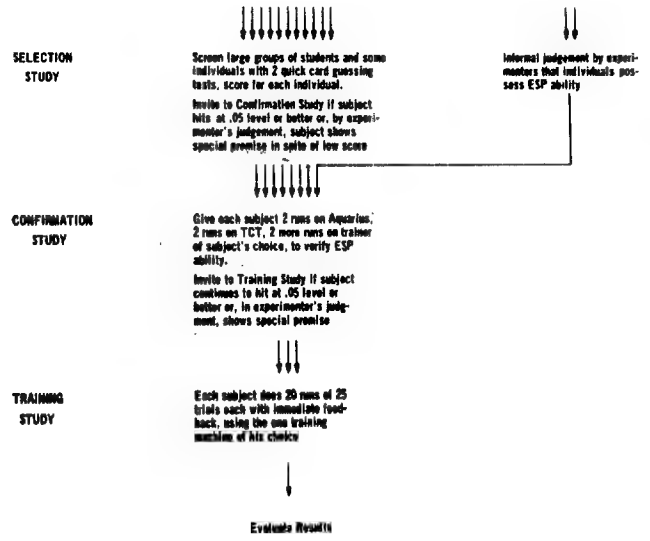

Fig. 1. Sequential selection procedure in the two Training Studies.

six individual test runs of 25 trials each. Two were on the ten-choice trainer (described below), two were on the Aquarius Model 1000 ESP trainer, a four-choice machine, and two more on whichever of the two machines each student preferred to do two more runs on. Since it would be highly unlikely that a student who made the criterion in the Selection Study by chance alone would also make the criterion of individual significance in the Confirmation Study ($\frac{.05}{} \times \frac{.05}{} = .0025$), we assumed that almost all students who scored significantly in both studies probably had genuine ESP talent, and they were invited to the Training Study.

A few students went directly into the Confirmation Study without going through the Selection Study because individual experimenters had other reasons to suspect they might have demonstrable ESP ability.

We will deal only with data from the ten-choice trainer (TCT) in both the Training Studies in this paper, as individual trial data was not recorded for the Aquarius four-choice trainer in the first study. Ten student percipeints completed the first Training Study and seven new percipients completed the second Training Study. "Completed" means doing 20 runs of 25 trials each on the TCT, over several sessions, our a priori criterion. Results in this paper deal with Training Study data.

THE TEN-CHOICE TRAINER

The TCT consisted of a percipient's and experimenter/sender's console. The two consoles were located in separate rooms, as shown in Figure 2. The percipient or "receiver" was alone in the laboratory room shown in the lower left-hand corner of Figure 2, sitting in front of his

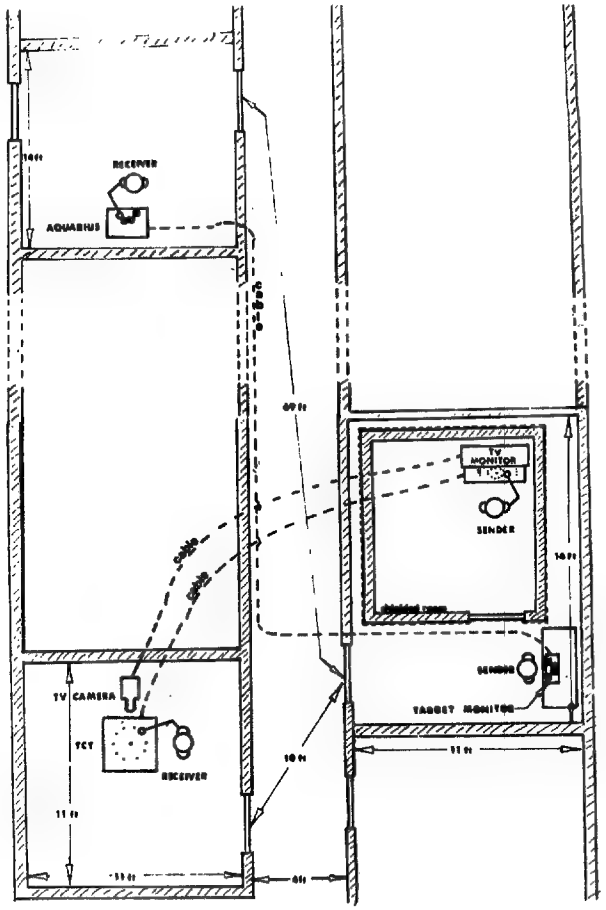

Fig. 2. Arrangement of the experimental laboratories.

console. A TV camera was focused on the console. The experimenter/sender was inside a Faraday cage constructed of thin copper sheets soldered together over an otherwise ordinarily constructed room, and this Faraday cage was inside another room, across the hall from the percipient's room. The shielding of the Faraday cage was not intact, however, due to power cables and the TV monitor and TCT interconnecting cables. The laboratory arrangement for the Aquarius 4-choice trainer are also shown, although I shall not deal with data from that trainer in this paper.

Figure 3 is a diagram of the arrangement of the percipients' console. It had ten unlit lamps arranged in a circle about 15 inches in diameter, with a miniature playing card glued beside each lamp to numerically identify them. A response push button was located beside each lamp. When the Ready lamp in the center of the console came on, the percipient knew that the experimenter/sender had selected (in accordance with the output of a random number generator, to be described later) one of the ten lamps as a target, and was trying to telepathically "send" the identity of that target to him.

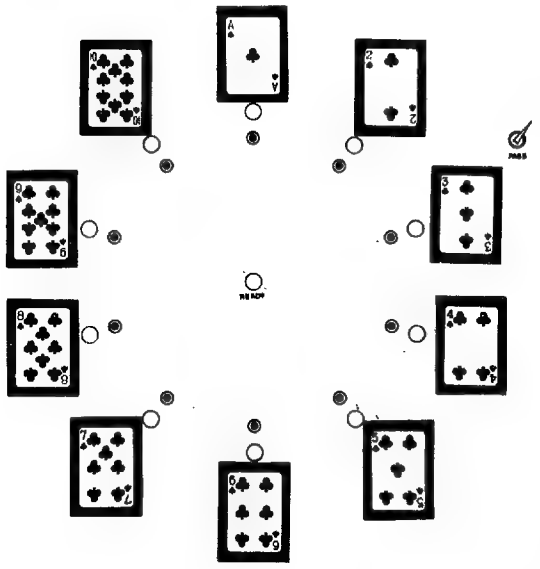

Fig. 3. Layout of the percipient's (receiver's) TCT (ten-choice trainer) console. Target #4 is shown as lit, indicating it was the correct target for whatever the percipient's response was.

The percipient could respond quickly or take as much time as he wished to make his decision. When he had decided on which number he though the target was, he pushed the response button beside it: electrical circuitry immediately scored his response as a hit or miss, and lighted the lamp on the percipient's console which corresponded to the correct target, so the percipient had immediate feedback on whether he was right or wrong. When he was right a chime rang inside his console, as well as the correct light coming on.

If, on a given trail, a percipient felt he had no idea what the target was, he could push the Pass switch, signalling to the experimenter/sender that he would like a new target. A pass was not counted as a hit or miss, and no feedback on correct target identity was given. Percipients rarely used the pass option. A circuit diagram of the TCT is available elsewhere[5].

Figure 4 is a drawing of the experimenter/sender's console and the TV monitor mounted above it. Except for operating controls, such as power switches, this console was laid out identically to the percipient's console.

In pilot work with the TCT, my students and I found that many percipients would slowly run their hand around the circle of unlit lamps, trying to get some kind of "impression" as to when they were over the correct lamp. The TCT was designed so no electrical or physical differences of any sort existed[5], so, on the null hypothesis of no ESP, this was an irrelevant procedure. Because of this, however, we had a TV camera focused on the percipient's hand movements so the sender could tell when the percipient was "hot" or "cold," and so could intensify, diminish or modify his sending effort accordingly.

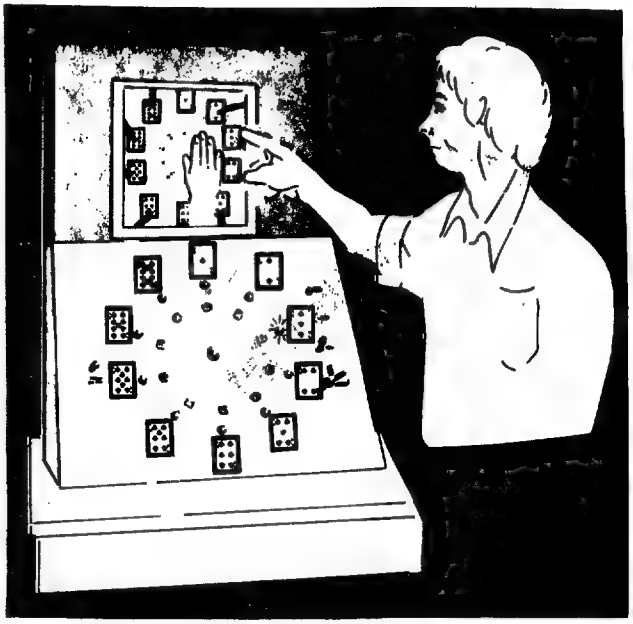

Fig. 4. Layout of the experimenter/sender's TCT console. Target #3 has been selected and the experimenter, watching the image of the percipient's hand movements on the TV monitor, is trying to "send" the percipient a telepathic message to "Go back!" since the percipient has just moved his hand past the correct #3 target to the #2 target.

The experimenter/senders found this full feedback of ongoing process to sender to be extremely involving, and I think it is quite important, although I have not assessed its effect independently. In terms of training people to use ESP, we were actually training each experimenter/sender and percipient as a team, with full feedback to each.

Electrical counters on the TCT automatically recorded the number of trials and the number of hits. Runs were standardized at 25 trials. If, as rarely happened, the pass option was used, additional trials were given so the total of scored trials was 25. On other rare occasions, when an experimenter accidentally ran one or two more trials than 25, all data beyond 25 trials were deleted.

RANDOM NUMBER GENERATOR

Target selection was controlled by an electronic random number generator (RNG). This

was of the "electronic roulett wheel" type, with one megahertz clock cycling a zero to nine counter over and over again. The length of time the clock was connected to the counter was controlled by the experimenter/sender manually depressing a push button. Since controlable human reaction time is several orders of magnitude slower than the clock speed, which output from zero to nine is selected is a random event. The circuit of the RNG, designed by Dana Redington, is shown in Figure 5.

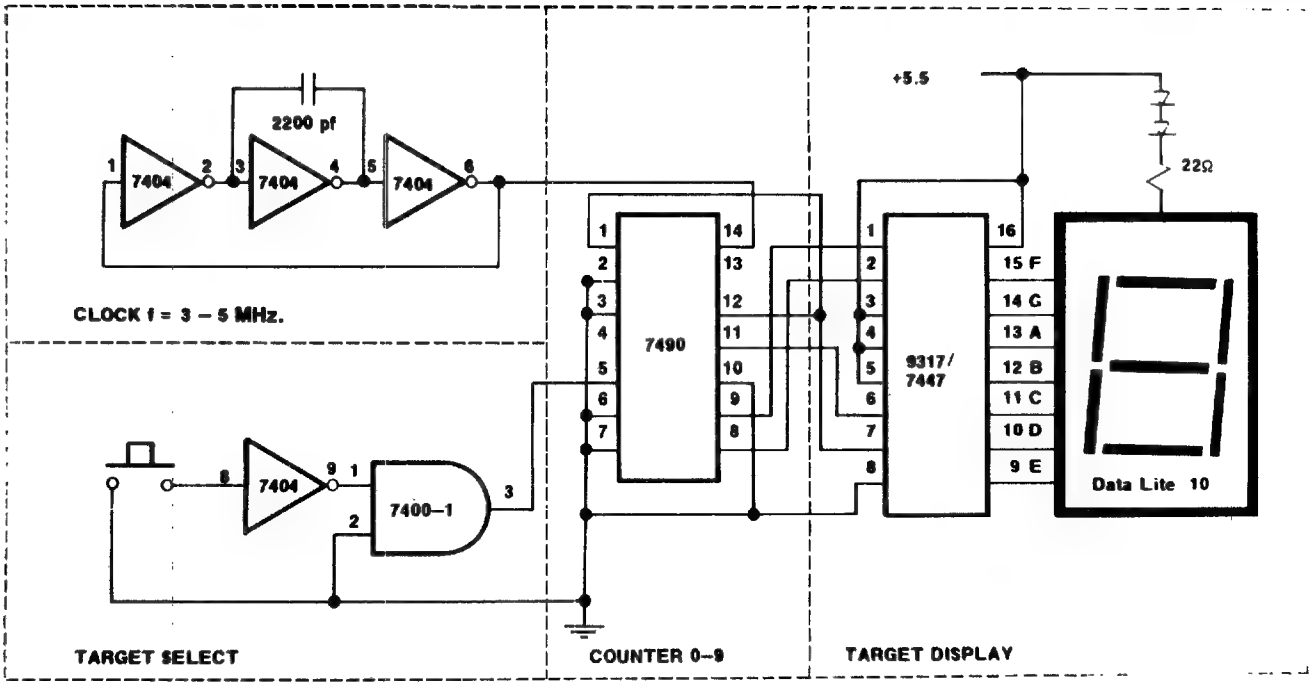

Fig. 5. Circuit of the random number generator (RNG) used to generate targets for the TCT. Integrated circuits are Signetics types 7404, 7400, 7447, and 7490. Seven segment display is a Litronix Data Lite 10.

Empirical tests, using a Chi-square analysis for equal incidence of individual targets and equal incidence of all 100 possible pairs of target selections, on 1000 trial test blocks collected before and after the first Training Study, showed satisfactory randomicity. We did not test for even higher level possible sequential effects (triplets, quadruplets, etc.) as there is no theoretical reason to expect any sequential effects with this type of RNG.

The TCT was used to gather the data in the first Training Study. We replaced it in the second Training Study with a more sophisticated and somewhat more automated version, ADEPT (Advanced Decimal Extrasensory Perception Trainer), designed and constructed by Dana Redington[7], which was similar to the TCT except for the fact that individual trial data was recorded automatically by teletypewriter, and the RNG was internal to the machine, whereas with the TCT the individual trial data was recorded by hand and the RNG was external to the machine. Total trials and total hits were both recorded automatically on both machines.

PSYCHOLOGICAL FOCUS ON REAL TIME EVENTS

In both Training Studies, neither I, my experimenters, nor the percipients had any interest in precognition. Our conception of the experiment was that we were trying to train real time ESP, either clairvoyance (direct perception of the state of the TCT) or telepathic (perception of the experimenter/sender's knowledge of the correct target) transmission of ESP information. This psychological focus is important to note, in light of later results.

Figure 6 illustrates the temporal aspects of target generation. Given that a target had already been generated and the TCT activated (Ready light comes on on the percipient's console) for trial N, a percipient would take a variable period of time, from a second or two to sometimes minutes, to decide on what he

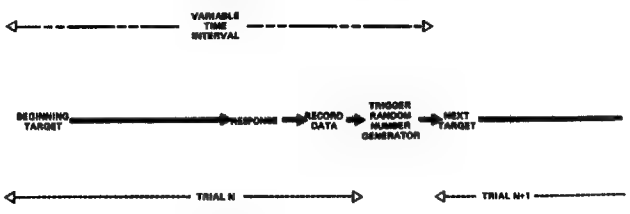

Fig. 6. Temporal sequence of target generations.

thought the target was. He would then push a response button, giving himself feedback and lighting a target lamp on the experimenter/sender's console showing what the percipient's response had been. The experimenter/sender recorded the response on his record sheet (the target had already been noted), turned off the TCT, and then triggered the RNG to select the next random number. When this selection had been made, in a second or so, he switched on the target lamp for trial N + 1.

During the time that a percipient was trying to use ESP to determine what the current, real time target was, then, the target for the next trial had not yet come into existence, nor could it be inferred from any knowledge of current events. The RNG had not yet been activated. Any significant information about the future targets, then, would have to be due to precognition.

SCORING RESPONSES

For evaluating the presence of ESP and subsequent analysis of learning effects, we were interested in real time hits, and all scoring was done for such hits. The top third of Figure 7 shows data from an actual run from percipient E1S5. The top row shows the 25 targets that were sequentially generated, the second row the percipient's response to each one. Real time hits are circled. There were six of them for this particular run. This happened to be an individually significant run, as the exact 1-tailed binomial probability of 6 or more hits in 25 trials (with a P of .1) is 3 in 100.

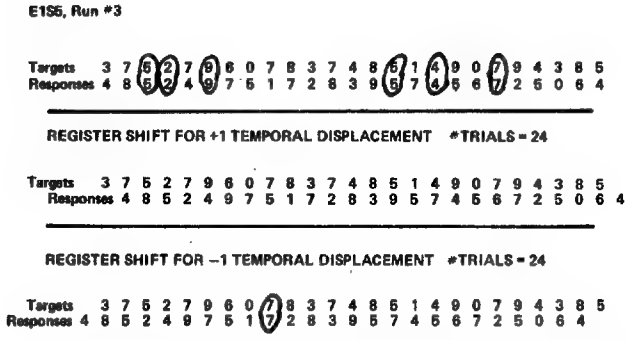

Fig. 7. Target and response sequences for percipient E1S5, third run, illustrating scoring techniques for real time hits, +1 precognitive hits, and −1 postcognitive hits.

Although I knew that it was relatively routine in parapsychological experiments to check for possible precognitive effects, I personally had no real interest in them, and had not gotten around to such checking until some analyses for another purpose by a colleague in the Genetics Department, Lila Gatlin, suggested to me that there were important precognitive effects worth looking at. The computer was reprogrammed to do temporal displacement analyses then, in the style shown in the middle and lower thirds of Figure 7.

To see if a response given by a percipient at time N was a hit or a miss on the target at trial N +1, the +1 temporal displacement, the response register was uniformly shifted one position forward in time. In the example shown, there were no hits with this procedure. N is reduced to 24 for such a shift, as the last response has no future target to be scored against.

To look at −1 past temporal displacement, as shown in the bottom third of the figure, the response register is shifted uniformly backwards one position. In this case there was 1 hit by this procedure. N is again reduced to 24. A similar procedure allows looking at any temporal displacement, forward (+1 through +24) or back (−1 through −24).

In looking at possible hits displaced forward in time, any significant deviations from chance expectation must be due to some kind of precognitive ESP, for, as discussed earlier, these targets did not yet exist and could not be predicted from any knowledge (sensory or extrasensory) of current events. In looking at temporal shifts backwards, my immediate reaction was to believe these would indicate something about ordinary psychological processes in the percipient: because of the immediate feedback of results, percipients knew what the immediately past target had been (to the extent that they had not forgotten it). The situation may be more complex than that for past displacements, however, as we shall see later.

ESP MISSING

An interesting effect that has been reported in many dozens of published ESP experiments[8,9] is what is called ESP-missing (or psi-missing), scoring that is significantly below chance expectation. Scoring below chance expectation can indicate as much ESP is operating as scoring above chance expectation can. If you are guessing whether the cards in an ordinary deck are red or black, for example, getting zero right is just as significant as getting all 52 right.

In terms of a model underlying the process, some non-conscious part of the mind must use ESP to correctly identify certain targets, and then influence conscious guessing processes to make sure that these targets are not guessed correctly. This has been associated with motivation in a number of parapsychological studies:

percipients who have an a priori disbelief in ESP, and who are statistically naive, but who (like most of us), think that the worse you score on a test the less you know, have often been shown to score significantly below chance, thus thinking they have validated their belief that there is no such phenomena as ESP[10,11].

ESP MISSING IN THE FIRST TRAINING STUDY

The 10 percipients who completed the first Training Study showed exceptionally significant results in terms of real time hitting. For their total of 5000 trials[12], we would expect 500 hits by chance, but 722 were observed. The two-tailed probability of such an occurrence, using the normal approximation to the binomial, is 2×10^{-25}. This corresponded, for the group as a whole, to an average of 3.61 hits per run of 25, rather than the average of 2.50 expected by chance.

There was considerable individual variation, of course, with a few percipients apparently having their overt manifestation of ESP suppressed in terms of real time hitting and not showing individual significance, a finding often associated with changes in psychological conditions[8] such as we had in going from the Confirmation to the Training Study. But five of the 10 percipients showed exceptionally significant individual scores. The least of these 5 averaged 3.90 hits per run, for a P of 4×10^{-5}, and the most significant averaged 6.20 hits per run, for an individual P of 4×10^{-28}.

In scoring for hits on the +1 future trial, there were 4,790 trials where a hit could have occurred (a few possibilities were lost when an experimenter inadvertently gave only 24 trials in a run, as well as the routine loss of 1 trial in each run), so 479 hits would be expected by chance. Only 318 hits occurred: this would occur by chance with a 2-tailed probability of 8×10^{-15}. Thus some part of the percipients' minds was occasionally using precognition to know what the +1 future target was and then affecting the conscious guessing of the real time target to be sure it was not what the +1 target would be. All other possible future displacements (+2, +3 . . . +24) were checked, but were not of such obvious significance, and so will not be reported on in this paper.

Past temporal displacements were also checked, and a rather regular pattern was found for the -1 and -2 displacements. Figure 8 is a bar graph of this for a percipient, E1S1, whose individual pattern is typical of that of many other percipients. He made 78 real time hits, when 50 would be expected by chance, $P = 4 \times 10^{-5}$, 2-tailed. His avoidance of the immediate +1 future was also extremely significant, $P = 3 \times 10^{-4}$, 1-tailed. His avoidance of the immediate -1 past was even greater, $P = 5 \times 10^{-8}$, 1-tailed. This avoidance of -1 past targets being greater than

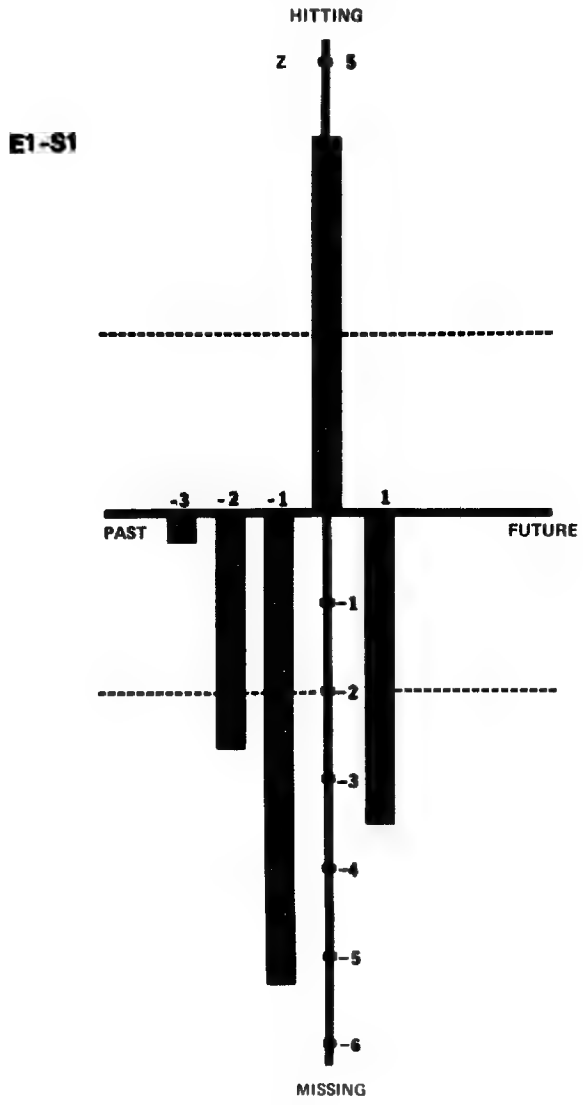

Fig. 8. Scoring pattern over all 500 trials (20 runs) of percipient E1S1 for -3, -2, -1, real time, and +1 temporal displacements. Units of vertical axis or standard normal deviates (Z-scores, σ).

the avoidance of the +1 future was the typical pattern for almost all percipients.

The past targets at the -2 displacement were also significantly avoided, but by the -3 displacement and for other greater temporal displacements, the group average was generally small, being only non-significant variations around chance. This suggests something in accordance with known psychological facts about people's guessing habits, namely that percipients strongly avoid making their guess identical to what the immediately previous target has been, a similar psychological avoidance holds, but is not quite so strong, by two targets back, and is pretty much inoperative by

three or more targets back.

RELATIONSHIP BETWEEN REAL TIME HITTING AND AVOIDING THE FUTURE

It turns out that this precognitive avoidance of the immediate +1 future in the first Training Study was not an isolated event, but was quite strongly and negatively related to the degree of real time hitting. Figure 9 shows the magnitude of the real time hitting and the +1 missing (hitting in one case) for each individual percipient. The vertical axis is Z or σ score, with anything greater than 2σ conventionally being accepted as statistically significant. I

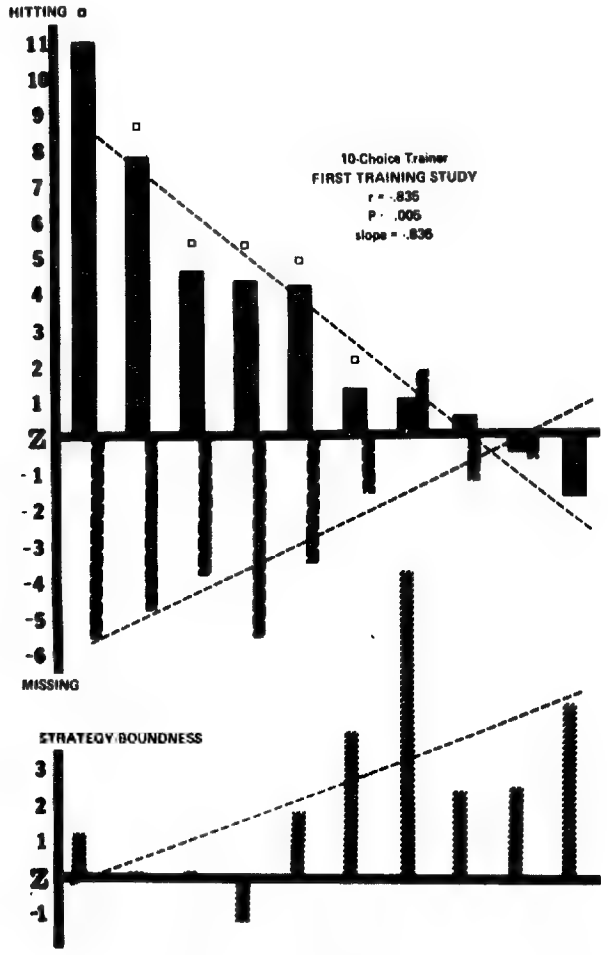

Fig. 9. Relationship between real time hitting, +1 future missing, and strategy-boundness, first Training Study.

have ordered the real time hitting scores from the highest on the left down through the greatest degree of missing on the real time target to the right. The rather good ordering of missing scores on the +1 future target that then results is an indication of the strength of the relationship between these two measures, which, statistically speaking, should be totally independent. The dotted lines are fitted regression lines. As can be seen, there is an extremely strong relationship: the more a percipient tends to hit on the real time target by ESP, the more he tends to avoid the +1 future target. The correlation is $-.835$, $P < .005$, 2-tailed. A rank order correlation, which makes somewhat less assumptions about the characteristics of the numerical scaling[13], gives $r = -.89$, a slight increase. We shall consider the lower graph, labeled strategy-boundedness, later.

The small squares beside each individual percipient's data indicate when the real time hits were significantly different from the +1 future missing by a t-test, applied over the 20 runs of each individual percipient. Six of the 10 percipeints show such significant differences, including one whose real time hitting no longer showed individual significance by itself.

As a further test to be certain that the negative relationship between real time hitting and +1 future missing in the first Training Study did not result from peculiar numerical properties of the target and response sequences, a control experiment was carried out in which the target sequence for each percipient was paired with the response sequence from some other percipient and the same analyses carried out. There were no significant "real time" hits, no significant +1 missing, and no relationship between the two.

PSYCHOKINESIS AS AN ALTERNATIVE TO PRECOGNITION?

Because numerous studies have shown that humans can influence the output of electronic RNGs simply by willing some outputs to come up more frequently[14] (psychokinesis, PK), and because we could not be sure that some of our percipients might not unconsciously use PK on the RNG, rather than just using ESP to know the state of the machine or the experimenter/sender's mind, we made an a priori decision to test our RNGs for randomness before and after our Training Studies, but not during them, when percipients might be "on line" in the sense of being concerned about and possibly influencing the RNGs.

As a post hoc, exploratory study, we did test the individual target sequences of each percipient for randomicity, and found that 3 of the 17 sequences (both Training Studies combined) did show statistically significant departures from randomicity, as per our hypothesis that our percipients might unconsciously use PK on the RNGs. Two of the nonrandom target sequences were for the two highest scoring percipients in the first Training Study, E1S3 and E1S5. Although the magnitude of these target sequence departures from randomicity was small compared to the magnitude of the ESP effects, suggesting that these percipients occasionally used PK on the RNG but

were mostly using ESP, I did check the correlations between real time hitting and +1 future missing to see if they would be affected if the data from these two percipients were thrown out. The differences were trivial and can be ignored: for the first Training Study, r = -.81 instead of r = -.84.

REPLICATION OF EFFECTS IN THE SECOND TRAINING STUDY

The second Training Study was not as successful as the first in terms of magnitude of real time ESP shown, an unfortunate, but predicted, effect. Our second Selection Study and second Confirmation Study did not give us individual percipients with as high scores as we had in the first Training Study. The group of percipients who entered the first Training Study had Confirmation Study scores ranging from 2.50-6.00 hits per run of 25 (chance is 2.50), with a mean group score of 4.78, while the corresponding range was 2.75 to 4.50, group mean of 3.61 hits/run, for the percipients who completed the second Training Study. The difference was statistically significant ($P < .05$, 2-tailed, by t-test). Ideally, we should have run more students through our Selection Study and Confirmation Study procedure, and made the ESP talent level comparable to that of the first Training Study. Time, money, and manpower shortages prohibited this, so we used the percipients we had, but predicted that our overall level of ESP would be smaller in the second Training Study. It was.

Seven percipients completed the second Training Study. The overall group mean (2.61) did not differ significantly from chance expectation, although two of the seven percipients showed individually significant results. One of these percipients showed individually significant real time hitting (average of 3.20 hits/run, $P < .05$, 2-tialed), the other showed individually significant real time missing (average of 1.85 hits/run, $P < .05$, t-tailed), so they effectively cancelled each other out.

Figure 10 shows the individual percipient results for real time scoring and +1 missing or hitting. My hypothesis that we still had talented ESP percipients, but that the increased pressure of the Training Study had probably inhibited their ESP abilities, as in the first Training Study, was confirmed. Five of the seven percipients showed individually significant differences (t-test) between their real time scores and +1 future scores. The negative relationship between real time hitting and +1 missing was again confirmed, with r = -.733, $P < .05$, 1-tailed. The more conservative rank order correlation gives r = -.79, a slightly stronger effect. The slight apparent reversal of the effect for the top three real time hitters does not detract substantially from the overall correlation. It might suggest

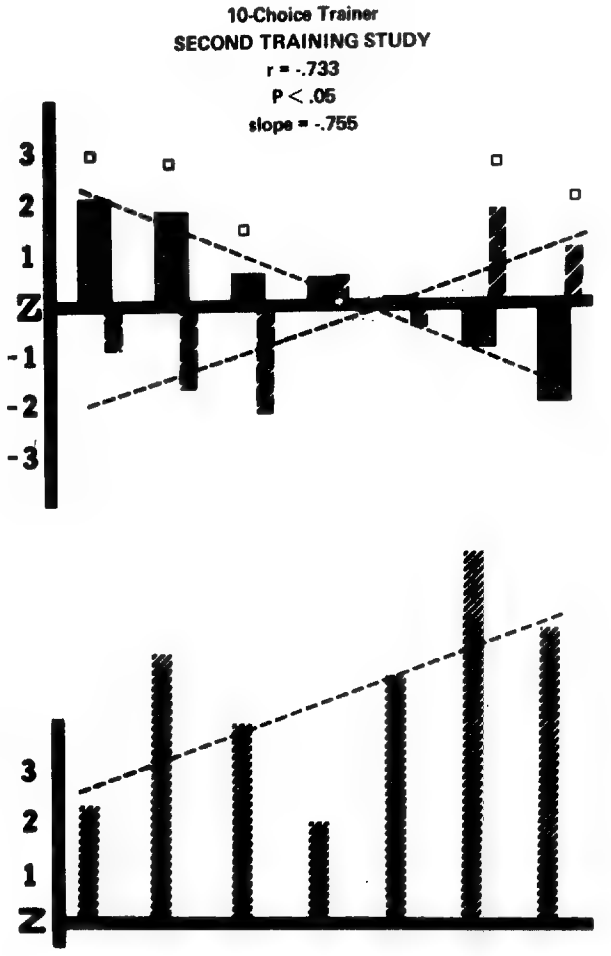

Fig. 10. Relationship between real time hitting, +1 future missing, and strategy-boundedness, second Training Study.

non-linearity, but, given the following discussion, this is unlikely.

As in the first Training Study, I carried out an exploratory, post hoc analysis for possible nonrandomicity in the percipients' target sequences that might represent a PK effect. One of the seven target sequences, for percipient E2S10, showed too many 7s. Curiously, this percipient scored almost exactly at chance expectation (51 hits versus 50 expected) for real time hits. Conservatively deleting the data of E2S10, however, again has a negligible effect on the correlation between real time hitting and +1 future missing: r = -.74, $P < .05$, 1-tailed.

In many ways, the percipients from the Second Training Study amounted to a sampling of the lower end of the distribution sampled in the first Training Study, so I combined results of the two Training Studies, to produce

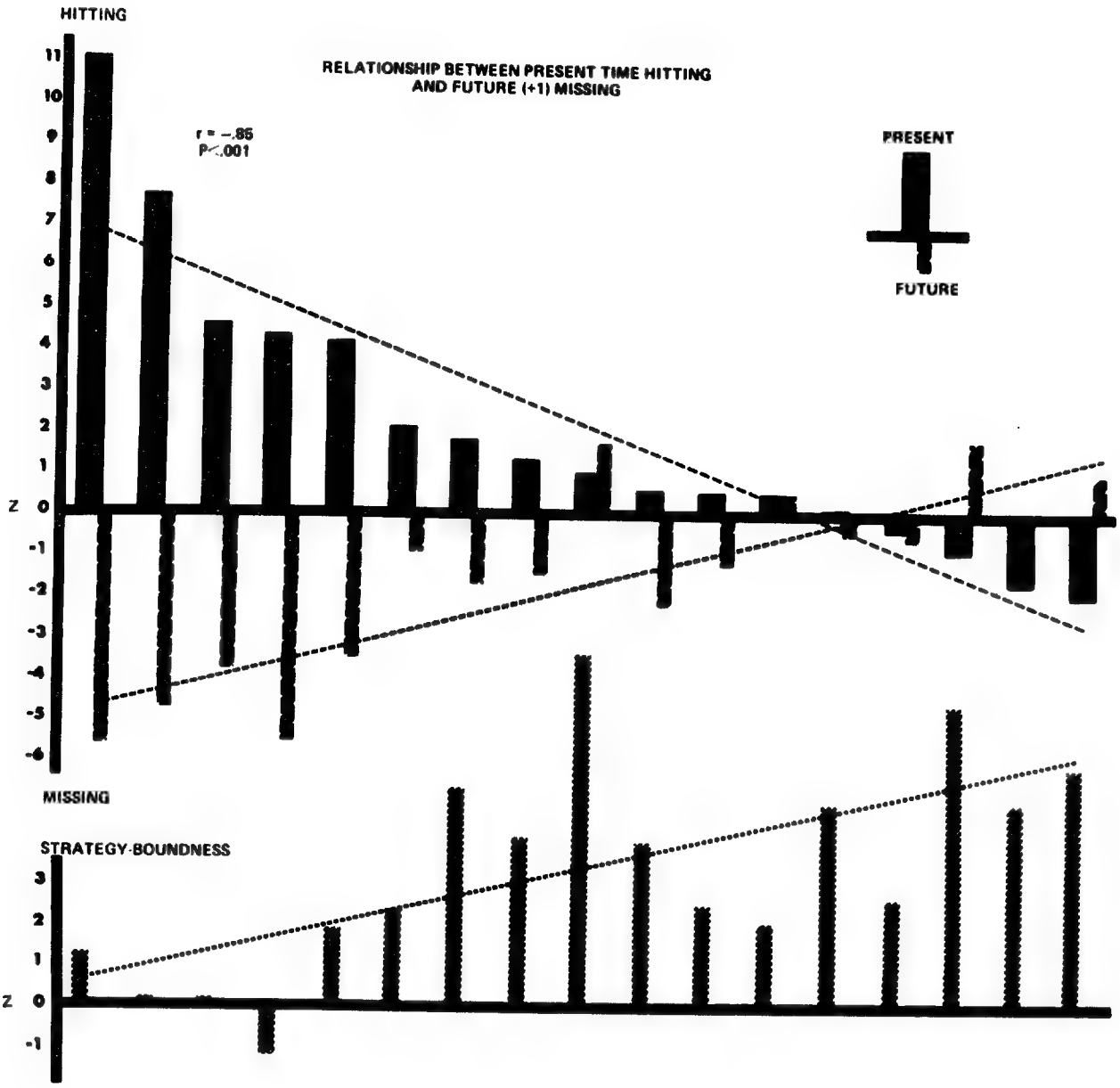

Fig. 11. Relationship between real time hitting, +1 future missing, and strategy-boundedness, combined data of both Training Studies.

the diagram shown in Figure 11. Here the strong negative relationship between real time hitting and +1 missing stands out very clearly ($r = -.85$, $P < .001$, 2-tailed). The more conservative rank order correlation is also -.85. The highly successful real time ESP percipients strongly suppressed the immediate future, while the ones who, under the increased psychological pressure of the Training Study, tended to switch to missing in real time, an incorrect focusing of the ESP effect, showed some tendency to switch to hitting on the immediate future.

If, to be very conservative, the data of the three percipients showing nonrandom target sequences are deleted from the overall correlation, the change is negligible, with r changing from -.84 to -.82 instead, so the data from these three percipients will be left in. More microscopic analyses, aimed at distinguishing these small possible PK effects from ESP effects will be undertaken in future publications.

Such a significant, negative relationship between real time hitting and +1 missing has not, to my knowledge, been previously reported in the experimental parapsychological literature[15]. This may be partly due to the fact that it has not been looked for, but I also suspect it is partially due to a procedurel

difference. In the present Training Studies, there was a sequential generation of targets "on line," as it were. In most parapsychological studies, until fairly recently, targets have been thoroughly shuffled decks of cards. In precognition studies with cards, the entire sequence of future targets is generated simultaneously when they are thoroughly shuffled at a future time, rather than being generated one by one after each real time response.

I shall now present the theory I have devised to explain these results. I am deeply indebted to Enoch Callaway, a colleague at the Langley Porter Neuropsychiatric Institute, who, after seeing a preliminary analysis of this data, suggested that they resembled a neural inhibitory surround, and started the train of thought in me that led to the following theory.

THE DURATION OF THE PRESENT

If you will stop to ask yourself what is "present" to your experience, you will find that your experienced present, although very short, definitely seems to have a certain duration. The mathematical abstraction of the present being a temporal point of zero width, sandwiched between past and future, is a useful abstraction in a variety of applications, but a poor representation of psychological experience. In Figure 12, the heavy lines model what we might call, by analogy with filters, the "passband" of the experienced present. For some small duration,

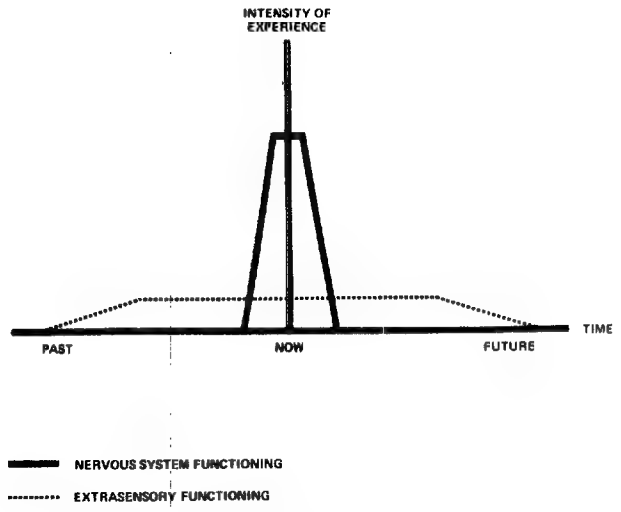

Fig. 12. Intensity and duration characteristics of the experienced present for ordinary consciousness (heavy lines) and the extended aspect of the mind that uses ESP (dotted lines).

centered around the now, all actions and experiences are now. The length of this interval is slightly variable, depending on how our attention is focused, and probably is ordinarily somewhere between one-tenth and two-tenths of a second wide. Within this experienced now, the intensity of experience (the vertical axis) is very high. At the edges of the passband experience drops in intensity and clarity. Dynamically, we should picture this passband as moving along horizontally from past to future. Whether experience within this passband of the experienced now is actually continuous or consists of discrete frames, with awareness of the inter-frame interval suppressed, is an interesting question.

An old psychological term for this effect was the "specious present," a term I do not like, as it shows that the mathematical abstraction was being considered more real than actual experience, implying that direct experience was specious. I shall speak of the experienced present, and its width. By using "outside" time sources, such as a clock, we can say that the experienced present has a definite width, even though to the mind, this small segment of time is all now.

PRECOGNITION AND THE EXPERIENCED PRESENT

There are dozens of published parapsychological studies indicating that precognition, under laboratory conditions, is a genuine phenomenon[8,9]. These results are usually conceptualized as the future "influencing" the present, or as information flow from the future to the past. Reactions to this data are frequently mixed with "absolute" questions about free will versus determinism or causality, and discussions get phrased in such absolute terms that they lead nowhere.

An alternative way of accounting for the data of precognition is to postulate that there is some other temporal dimension of mental functioning, a temporal dimension in which time "flows at a different rate" or some such thing, with the consequence that the experienced present of the mind in that other temporal dimension has a greater duration, a wider passband than our ordinary experienced present. This wider passband is shown in Figure 12 as the dotted line. The exact shape of the passband as drawn is not important: it merely represents that, ordinarily, the intensity of experience tapers off to near zero at some point.

I am proposing that the aspect of mind which is activated on those occasions when ESP abilities are used has two properties different from our ordinary consciousness, which seems spatially localized with respect to the brain and temporally localized with respect to the time system's physical processes of brain operation. The first property is that this other dimension of the mind is not so spatially

localized, and can thus somehow pick up information at spatial locations outside the sensory range of the body/brain/nervous system. The second property is that the center point of the experienced present of this other dimension of the mind can be a different time than the physical time associated with the body/brain/nervous system, and the band width of that other part of the mind's experienced present is wider than the band width of our ordinary consciousness's experienced present. Thus what is now in this other dimension of the mind may include portions of time that, from our ordinary point of view, are past and future, as well as present.

Since consciousness (or basic awareness, as I prefer to call it in my systems approach to consciousness[16]) is ordinarily fully identified and preoccupied with body/brain/nervous system functioning, the experienced intensity of the parts of mind that operates in this other temporal and spatial dimension is ordinarily quite low, usually below conscious threshold, and is shown accordingly so in the figure.

When a percipient is asked to use ESP, he must disregard ongoing sensory input (the experimental conditions make it irrelevant) and whatever fantasies or strategies he has about outguessing the RNG (since targets are equiprobable and sequentially independent), and try to "contact" or "tune in" to that aspect of mind which exists or is capable of using this broader spatial and temporal dimension. Considering the temporal aspects of it, this creates a problem. If your desire is to obtain real time information, being "sent" by the experimenter/sender in another laboratory, then simply tapping into the wider experiential present of this other dimension is not good enough: its now includes information about past and future events, as well as present events. Since your goal is present event information, this past and future information is noise which may interfere with detection of the desired signal.

Given the psychological set of experimenters and percipients in our studies, namely concentrating on getting the real time information by ESP, this implicitly defined the temporal boundaries of that real time information as the immediate -1 past and the immediate +1 future targets/trials. We shall consider effects of altering this psychological definition later.

Figure 13 models what a percipient must do to use ESP successfully, then, to get real time information. His awareness is receiving irrelevant sensory information that must be disregarded. His memories of what past targets have been may suggest guessing strategies, but they are irrelevant, since each output of the RNG is independent of the previous ones. He must occasionally tap into that dimension of mind that uses ESP, but since that part of the mind is getting

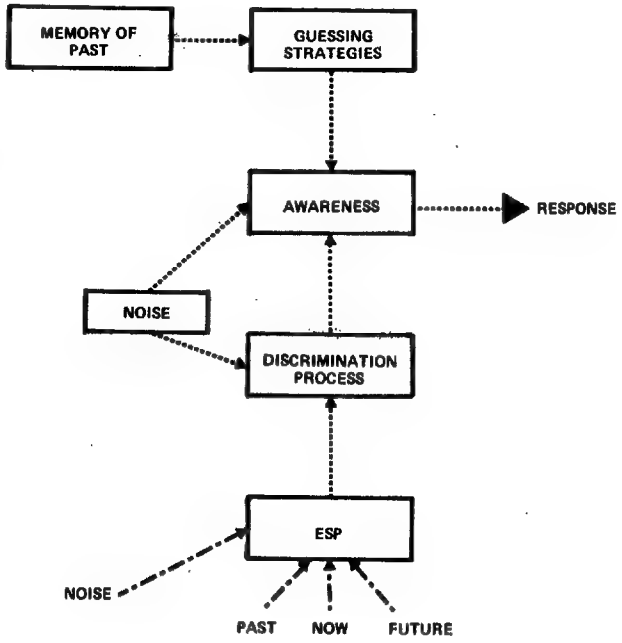

Fig. 13. A model of psychological processes used in making a successful ESP response.

information about past and future as well as present, he must further add a discrimination process of some kind which will clearly identify the past and future aspects of the ESP information, and then actively suppress such aspects, in order to enhance the detectability of the real time, desired ESP information. The output of the discrimination process, then, consists of some kind of information designed to influence the percipient's conscious guessing processes to correctly guess the present real time target, and to inhibit guessing target identities which are the same as the immediate future and the immediate past targets, lest the past or future be confused with the present. The non-conscious ESP and discrimination processes may certainly work intermittently and imperfectly, depending on other factors which could constitute both systematic or random noise at various stages in the total information flow system.

TRANS-TEMPORAL INHIBITION

What I am postulating, then, is an active inhibition of the precognitively and post-cognitively gained information about immediate future and immediate past, in order to enhance the detectability of ESP information about real time events. Since this inhibition extends over time, I have named this phenomenon trans-temporal inhibition.

Except for the unusual features of extending over time rather than space,

trans-temporal inhibition is analogous to a widely used information processing strategy in the nervous system called lateral inhibition[17]. This is a general phenomenon of a highly stimulated receptor sending out inhibitory impulses to receptor endings laterally/spatially adjacent to it, thus suppressing their initially weaker output, unless they are also strongly stimulated by an appropriate stimulus. It amounts to an edge detection process. To illustrate: if you press on your skin with a sharply pointed object, not only is the touch receptor immediately under the point strongly stimulated, but, because of the mechanical deformation of the skin, receptors laterally adjacent to the point are also stimulated, although less intensely. The neural impulses resulting at the first stage of detection, then, would be most intense immediately under the stimulated point, but fairly intense on each side of it, gradually tapering off, producing a neural signal pattern suggesting a blunt, rounded stimulating object, rather than a point. The most stimulated receptor under the point, however, sends out inhibitory impulses suppressing the weaker (less frequent) impulses from the laterally adjacent receptors, and so recovering a pattern indicating point stimulation further on in the nervous system. The phenomenon of trans-temporal inhibition, then, suggests that a generally useful information processing procedure is also operative for ESP.

How well does this theory fit the data?

APPLYING THE THEORY TO THE DATA

In showing the +1, real time, and -1 score patterns of percipient E1S1 earlier in Figure 8 (we shall ignore the -2 and -3 points from now on, as they are not related to other things), I indicated that the very significant degree of missing on the immediately past -1 target probably reflected maladaptive guessing habits on the percipient's part. The RNG is so constructed that there are no sequential dependencies, i.e., the probability of two sequential targets being a one-one is identical to that of their being a two-two, a three-three, a three-four, a one-nine, etc. People, however, have inaccurate conceptions of what random sequences are, and usually believe that the probability of the same target occurring twice is considerably less than that of a different target following the original one, that is that one-one, two-two, etc., are all much less probably than one-two, one-three, two-four, etc. Thus the percipients tend to avoid giving a response that is the same as the previous target, and I suggest that this accounted for the very large degree of the -1 missing. The theory of trans-temporal inhibition, however, assumes that the experienced present of this other dimension of the mind is probably symmetrical in most circumstances: this is an assumption that will be made, paralleling the general assumption that works so well in the physical sciences, namely that all physical processes are symmetrical[16]. Given this symmetry assumption, I then postulated that the -1 missing could be partialed into two components. One of these would be post-cognitive ESP inhibition of the calling of the previous target, and I would further assume that this component would be approximately equal in magnitude to the inhibition of the +1 response for each percipient, treated individually. The rest of the missing on the -1 past displacement would be due to maladaptive guessing strategies, this business of tending not to repeat the immediately past target. I have named this component of the -1 missing, strategy boundness. Figure 14 shows this partialing out applied to the data of percipient E1S1. For this particular example, about half of the -1 missing would be assumed to be due to trans-temporal inhibition of the post-cognitive response to the -1 target and half to maladaptive strategy boundness.

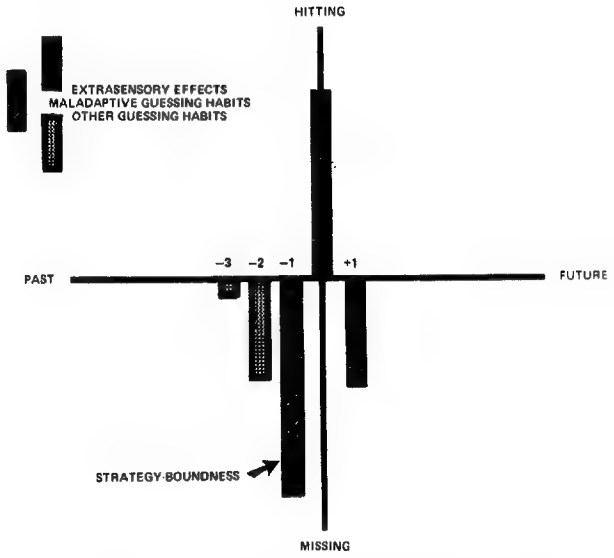

Fig. 14. Partialing out the strategy boundness measure from the total missing on the -1 temporal displacement.

My conception of the optimal way to try to use ESP is that all "rational" processes are irrelevant. A guessing strategy which involves keeping track of what the past targets have been and then trying to outguess the RNG is not only a waste of time (because of the sequential independence of the RNGO, but it distracts a percipient from turning his awareness toward more relevant mental processes, toward what we might call metaphorically "listening to the still small voice within" that might occasionally give a useful hint about target identity.

STRATEGY BOUNDNESS AND SUCCESS IN USING ESP

On theoretical grounds, then, we would expect that the more strategy boundness a

percipient showed, the less real time ESP he would show. Since trans-temporal inhibition of the future (and by assumption, of the past) target response is adaptive for enhancing real time ESP, we would also expect that with more strategy boundness there would be less missing on the +1 future target. The data bear this out quite convincingly.

Because the signs for the straight arithmetical computations of missing, strategy boundness, etc. require a good deal of attention to follow in terms of their relationships, I have taken the value of strategy boundness which is inherently negative (missing) and made it positive, to make the results clearer.

In orginally computing the correlations between real time hitting, +1 future missing, and -1 past missing for percipients in the combined two Training Studies, I found that +1 future missing was significantly correlated with real time hitting ($r = -.85$, $P < .001$), but the magnitude of -1 past missing did not correlate significantly with either the magnitude of real time hitting ($r = -.24$, non-significant) or with the magnitude of the +1 future missing ($r = +.14$, non-significant). After factoring out strategy boundness, as discussed above, it turns out that strategy boundness is significantly correlated with the other two measures. Strategy boundness correlates $r = -.64$, $P < .01$ with present time hitting, and $r = +.83$, $P < .001$, with +1 future missing. Referring back to Figures 9, 10, and 11, where the degree of individual strategy boundness was plotted for the percipients in the lower part of the graphs, the strength of this relationship is very clear. The more a percipient was caught up in maladaptive strategy boundness, the less likely he was to show real time hitting and the less likely he was to show trans-temporal inhibition, missing of the +1 future target. Strategy boundness can be conceived of as a failure to direct awareness to that part of the mind which is not so localized in space and time and so exercises ESP, but instead leaving awareness involved with ordinary aspects of the mind which cannot use ESP.

Applying the symmetry assumption, then, takes some random data (the absolute magnitude of the -1 past deviations) and partials it into highly meaningful data.

A FURTHER TEST OF THE THEORY

As I mentioned earlier, both percipients and experimenters in my two Training Studies were focused on the ordinary present, on the task of picking up real time information. This implicitly defined the immediate boundaries of the now as the +1 and -1 future and past target events. Since my data rarely suggest significant ESP missing on the +2 target (and, by the same sort of operations described above, on the -2 target), this suggests that while the experienced present of this other dimension of the mind was wider than the ordinary experienced present, it was not too much wider. Others' studies of precognition[8,9], however, have often dealt with events which are much further ahead in the future, minutes, hours, days, and sometimes months. Insofar as the trans-temporal inhibition theory is correct, I would predict that if the focus of attention is successfully placed on some <u>future</u> event, there ought to be ESP hitting on that event, but inhibition of responses to events temporally surrounding that future event. Using our filter analogy, with the experienced present of the dimension of the mind that uses ESP corresponding to the band width of that filter, it should be possible, by means of psychological processes, to shift the center point and/or the band width of the filter, and see a corresponding shift of trans-temporal inhibition. I have been able to carry out one test of this prediction to date.

Ingo Swann is a well know New York artist who posses a variety of ESP abilities which he has demonstrated under rigorous laboratory conditions in other investigators' laboratories, including Stanford Research Institute[18] and the City College of New York[19]. Swann was present at a small meeting of parapsychological researchers in October, 1976, when I presented the above data and the basic theory about trans-temporal inhibition, although I did not say much about the prediction of the possibility of shifting the center point of the experienced now of this other aspect of mind, or its predicted consequences. Swann was very intrigued by my data and made a number of useful comments on it, including his own observation that what he and the SRI researchers Targ and Puthoff called "analytical overlay" seemed to correspond to my concept of strategy boundness, any kind of "rational" but actually irrelevant activities that diverted one from relevant aspects of the ESP task. He wanted to try my ADEPT training device, and a few days later was able to briefly visit my laboratory.

I looked forward to his visit with considerable interest, for he would be the first percipient who, because he had heard about trans-temporal inhibition, would be psychologically set to have some concern with the immediate (+1) future target, as well as the real time target. I predicted he would probably show hitting on the +1 future target, but missing on the +2 future target. This is what happened.

Swann did 5 runs on ADEPT in the course of a little over an hour, for a total of 129 trials (in one run he inadvertently did 29 trials instead of the usual 25). He made 21 real time hits in the 5 runs, where only 12.9 would be expected by chance, $P = 9 \times 10^{-3}$, 1-tailed. In terms of +1 future scoring, he

made 19 hits when only 12.4 were expected by chance, P = .03, 1-tailed. His +1 precognition scores' significance is probably underrepresented by this conventional evaluation, because he tended to have bursts of hitting twice in a row on +1 precognition, and a separate evaluation of the probability of the number of doublet precognition hits he showed gives odds of 10^{-6}.

On +2 precognition hits, he scored only 7 hits when 11.9 would be expected by chance, P = .07, 1-tailed. This is not quite independently significant for below chance scoring by itself, but, as predicted, a t-test shows the difference between the scoring rate on the +1 and +2 hits is statistically significant (t = 2.59, 4 df, P < .05, 1-tailed)[20].

I later asked Swann if he was deliberately trying to guess the immediate future target as well as the real time target, and he replied that he had not been deliberately trying to do this, consciously he was concentrating on the real time target. This suggests that the passband of the "wider dimension filter" can be altered without there being full conscious awareness of it.

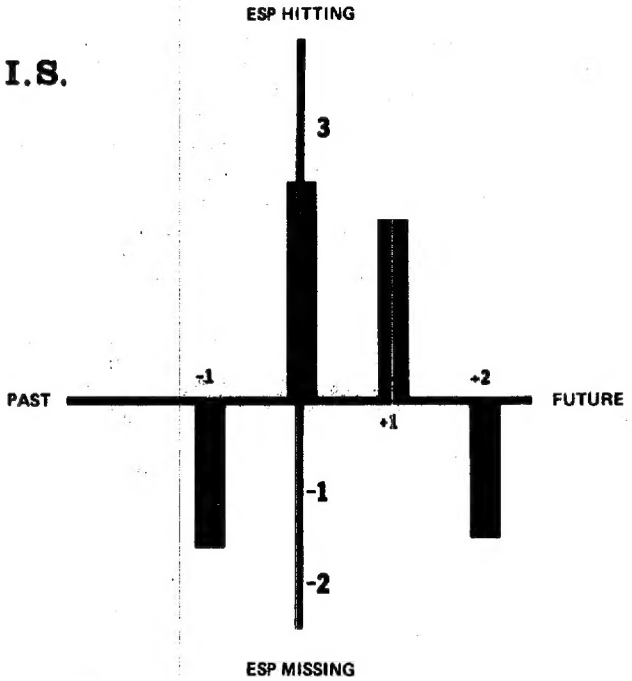

Fig. 15. Widened temporal passband for Ingo Swann.

Figure 15 shows Swann's performance on -1, real time, +1, and +2 temporal displacements. It is also interesting to note the magnitude of his -1 displacement score: it is only slightly larger than the +2 missing displacement, indicating a very low degree of strategy boundness. This is precisely what we would expect for someone with high ESP abilities. Incidentally, we should not overlook the fact that it is a quite amazing performance for Mr. Swann to have walked in "cold" off the street, as it were, and immediately shown statistically significant ESP in a new test situation.

Although it is a post hoc speculation, it is of interest to raise the question as to whether the "passbands" of some of the earlier percipients' trans-temporal inhibition processes were shifted in a manner analogous to Swann's. In the first Training Study, percipient E5S14 had Z-scores of -6.69 for -1 temporal missing, +1.04 for real time hits, +1.83 for +1 future hits, and -2.64 for +2 future missing, and the drop from +1 hitting to +2 missing is significant[21] (t = 3.40 with 19 df, P < .005, 1-tailed). In the second Training Study, percipient E4S4 had Z-scores of -5.48 for -1 temporal missing, -.89 missing on real time targets, +1.83 hitting on +1 future displacements, and -.78 on +2 missing. The difference between +1 hitting and +2 missing is significant (t = 2.00 with 19 df, P < .05, 1-tailed). The difference between +1 and +2 scoring for a third percipient from the second Training Study, E1S8, who showed a tendency toward hitting (Z = +1.06) on the +1 future target, is not at all significant (for +2, Z = +.62).

CONCLUSIONS

The major mystery about various kinds of ESP is how the information gets from the target to the percipient: once the percipient has "received" or "sensed" the information on some non-conscious level, it generally seems to be processed in psychologically familiar ways[22]. Trans-temporal inhibition is a general information processing procedure that is psychologically and neurologically familiar: the puzzle is in the precognitive (and postualted postcognitive) acquisition of the information about immediate future (and immediate past) targets.

Further data on these effects would be very desirable. Although emphasis of teaching improved ESP skills in our two studies made the provision of immediate feedback necessary, one clear line of research to follow, once percipients have been brought up to high levels of performance, is elimination of the feedback, so the postulated postcognitive inhibition component can be assessed independently of effects of maladaptive guessing habits. Further work on deliberatley shifting the focus of attention, as with Swann, is also needed. If the trans-temporal inhibition effect is validated, it ought to be possible to combine it with an information theory approach to optimize ESP performance: would long time intervals between trials, for example, make real time ESP more successful by reducing interference from future and past targets? Is comparing the contrast between real time hitting and +1 future missing a better measure of a percipient's

potential ESP capacity than hitting per se?

I plan considerably more analysis of the microstructure of the already collected data, and will, if funds become available, carry out further research along the lines suggested above. I hope others will investigate this fascinating new effect.

NOTES AND REFERENCES

1. Pratt, J. G., The meaning of performance curves in ESP and PK test data. J. Parapsychology, 1949, 13, 9-22.
2. Rhine, J. B., The Reach of the Mind. New York: Wm. Sloane, 1947. Pp. 189-190.
3. Tart, C., Card guessing tests: learning paradigm or extinction paradigm? J. Amer. Soc. Psychical Res., 1966, 60, 46-55.
4. Tart, C., Conscious control of psi through immediate feedback training: some considerations of internal processes. Submitted for publication.
5. Tart, C. Learning to Use Extrasensory Perception. Chicago: University of Chicago Press, 1976. The research reported in that book was generously supported by the Parapsychology Foundation, with administrative assistance from the Institute for the Study of Human Knowledge.
6. This second study by myself, John Palmer, Dana Redington, Henry Bennett, and my students, was supported by a generous grant from the est Foundation.
7. Construction of ADEPT was made possible by another grant from the Parapsychology Foundation.
8. Rao, R., Experimental Parapsychology. Springfield, Ill.: Charles C. Thomas, 1966, is an excellent survey of experimental work in parapsychology, although a little dated.
9. White, R. (Ed.), Surveys in Parapsychology: Reviews of the Literature, with Updated Bibliographies. Metuchen, N. J.: Scare-Crow Press, 1976. Updates the Rao book, above.
10. Schmeidler, G., & McConnell, R., ESP and Personality Patterns. New Haven: Yale Univ. Press, 1958.
11. Palmer, J., Scoring in ESP tests as a function of belief in ESP. Part I. The sheep-goat effect. J. Amer. Soc. Psychical Res., 1971, 65, 373-408. Also Palmer, J., Scoring in ESP tests as a function of belief in ESP. Part II. Beyond the sheep-goat effect. J. Amer. Soc. Psychical Res., 1972, 66, 1-26.
12. In the original publication of these ESP learning results[5], we worked with total run scores and did not realize that the total number of trials was slightly less than 5,000. The current total analysis here retains the convention of 5,000 trials to be consistent with the original publication, as this is a conservative error: the data are slightly more significant than the results here calculated.
13. Siegel, S., Nonparametric Statistics for the Behavioral Sciences. New York: McGraw-Hill, 1956.
14. André, E., Confirmation of PK action on electronic equipment. J. Parapsychology, 1972, 36, 283-293. Braud, W., et al., Psychokinetic influence on random number generators during the evocation of "analytic" versus "nonanalytic" modes of information processing. In Morris, J., et al., (Eds.), Research in Parapsychology 1975. Metuchen, N.J.: Scarecrow Press, 1976. Pp. 85-88. Honorton, C., & Barksdale, W., PK performance with waking suggestions for muscle tension versus relaxation. J. Amer. Soc. Psychical Res., 1972, 66, 208-214. Matas, F., & Pantas, L., A PK experiment comparing meditating versus non-meditating subjects. Proc. Parapsychol. Assn., 1971, No. 8, Pp. 12-13. Millar, B., & Broughton, R., A preliminary PK experiment with a novel computer-linked high speed random number generator. In Morris, J., Roll, W., & Morris, R. (Eds.), Research in Parapsychology 1975. Metuchen, N.J.: Scarecrow Press, 1976. Pp. 83-84. Schmidt, H., A PK test with electronic equipment. J. Parapsychol., 1970, 34, 175-181. Schmidt, H., PK tests with a high-speed random number generator. J. Parapsychol., 1973, 37, 105-118. Schmidt, H., Observations of subconscious PK effects with and without time displacement. In Morris, J., Roll, W., & Morris, R. (Eds.), Research in Parapsychology 1974, Metuchen, N.J.: Scarecrow Press, 1975. Pp. 116-121. Schmidt, H., PK experiment with repeated time displaced feedback. In Morris, J., Roll, W., & Morris, R. (Eds.), Research in Parapsychology 1975. Metuchen, N.J.: Scarecrow Press, 1976. Pp. 107-109. Schmidt, H., & Pantas, L., Psi tests with internally different machines. J. Parapsychol., 1972, 36, 222-232. Stanford, R., & Fox, C., An effect of release of effort in a psychokinetic task. In Morris, J., Roll, W., & Morris, R., (Eds.), Research in Parapsychology 1974. Metuchen, N.J.: Scarecrow Press, 1975. Pp. 61-63. Stanford, R., Zenhausern, R., Taylor, A., & Dwyer, M., Psychokinesis as psi-mediated instrumental response. J. Amer. Soc. Psych. Res., 1975, 69, 127-134.
15. Although there are more than 700 published articles showing experimental evidence for the existence of ESP and investigating its mechanisms, they are not generally known to the scientific community, having

appeared in specialty journals. The reader interested in getting into this literature should consult the International Journal of Parapsychology, the Journal of Parapsychology, the Journal of the American Society for Psychical Research, the Journal of the Society for Psychical Research (British), and the recent European Journal of Parapsychology.

16. Tart, C., States of Consciousness. New York: Dutton, 1975.
17. von Békésy, G., Sensory Inhibition. Princeton: Princeton Univ. Press, 1967.
18. Targ, R., & Puthoff, H., Mind-Reach: Scientists Look at Psychic Ability. New York: Delacorte, 1977.
19. Schmeidler, G., PK effects upon continuously recorded temperature. J. Amer. Soc. Psychical Res., 1973, 67, 325-240.
20. Five pairs of data points is a low N for a t-test and pushes the underlying assumptions, but I used it to be consistent with earlier analyses.
21. In comparing scores between real time, +1 temporal displacement, or +2 temporal displacement, we deal with a shortened run length in each case (25, 24, 23), meaning that the expected number of hits by chance would be slightly lower (2.5, 2.4, 2.3), so in doing the t-tests, this was compensated for by testing against the null hypotheses that $\sqrt{\text{real time hits}} = \sqrt{(+1 \text{ hits}) + (.1)}$ and $\sqrt{(+1 \text{ hits}) + (.1)} = \sqrt{(+2 \text{ hits}) + (.2)}$.
22. Tart, C., Psi: Scientific Studies of the Psychic. New York: Dutton, in press.